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# CATALOGUE

OF THE

# FISHES

IN THE

# BRITISH MUSEUM.

SECOND EDITION.

VOLUME FIRST.

LONDON:
PRINTED BY ORDER OF THE TRUSTEES.
1895.

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# CATALOGUE

OF THE

# PERCIFORM FISHES

IN THE

# BRITISH MUSEUM.

## SECOND EDITION.

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VOLUME FIRST.

CONTAINING THE

CENTRARCHIDÆ, PERCIDÆ, AND SERRANIDÆ (PART).

BY

GEORGE ALBERT BOULENGER,
F.R.S.

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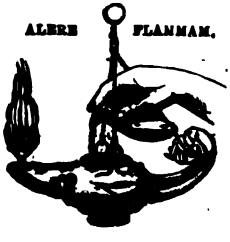


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# PREFACE.

In the Preface to the Eighth Volume of the 'Catalogue of Fishes,' written at the completion of the whole work, it was mentioned that a supplementary volume would follow embodying the additions that had been made to the Collection and to the literature during the progress of the work. This intention was never carried out. Simultaneously with the progress of the Catalogue, the workers in the field of Ichthyology had been so active that it seemed a hopeless undertaking for any one who could not devote the whole of his time and energy to this task, to bring the great mass of additional matter together in the shape of a Supplement. Indeed, by the time the work was completed (1870) the First Volume had become antiquated, so as not merely to require the insertion of additions but also a systematic revision of a great part of its contents.

The increase of the Collection continued steadily from year to year, and would have been much greater numerically but for the existence of the 'Catalogue,' by means of which desiderata could be readily recognized and the acquisition of unnecessary material avoided. The most important only of the additions received since 1870 can be referred to here. Some of them were obtained by Government Naval expeditions: thus the 'Transit of Venus' expedition brought home collections from Rodriguez and Kerguelen's Land (1876); Commander Cookson, when in command of H.M.S. 'Peterel,' collected in the Galapagos Islands (1875); the Officers of H.M.S. 'Alert' (1879–82) and of H.M.S. 'Penguin' (1892–93) sent

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fishes among the large store of other marine animals gathered by them in the Southern Hemisphere. But the by far most important contribution to our knowledge of Fishes, as well as to our Collection, is undoubtedly that brought home by the 'Challenger,' comprising littoral, pelagic, and bathybial forms from almost every part of the Ocean traversed by the ship. Somewhat later the 'Challenger' Deep-sea Series was further supplemented by the exploration of the Faroë Channel by Dr. John Murray on board H.M.SS. 'Knight Errant' and 'Triton' (1880–82); by a series of North Atlantic forms dredged during the Norwegian Expedition, and received from the Christiania Museum (1885); by species discovered by the French ships 'Travailleur' and 'Talisman,' and received from the Muséum d'Histoire Naturelle (1891); by species collected by Dr. Alcock on board the Indian S.S. 'Investigator' (1891); and finally by the latest discoveries made by Mr. J. Y. Johnson in Madeira (1891).

From the *British Islands* numerous specimens, many of great interest, were received. Large collections were those made by Dr. J. Murray on the West Coast of Scotland in 1887 and following years, and by the Rev. W. S. Green off the West Coast of Ireland in 1889. In the latter year the Museum received also a collection of British Salmonoids and marine fishes brought together by the late Mr. Francis Day, and presented by him shortly before his death.

From freshwaters or coasts of other *European* countries I may mention specially Dr. V. L. Seoane's collection of fishes of *Galicia* (1885); one from *Portugal*, purchased in 1887; two collections of Italian species received from the Museums of Florence (1885) and of Milan (1888); one from the *Adriatic* (Prof. Kolombatovic, 1891); one from the *Black Sea* (Dr. Dickson, 1888); and one from freshwaters of *Russia* (St. Petersburg Museum, 1879).

Interesting forms from *Lake Baikal* were received from the Museums of St. Petersburg (1872) and of Warsaw (1875); whilst the late Consul R. Swinhoe sent large collections from *Chefoo* and *Shanghai* (1873), and Mr. Styan obtained nearly complete series of the fishes of the middle course of the *Yantsekiang* (1888–93).

Mr. H. Batson Joyner collected largely in *Japan*, discovering several previously unknown forms (1878).

A most valuable collection of the fishes of the *River Tigris* was made for the Museum by Dr. W. H. Colvill in 1874; numerous

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types of the *Red Sea* fishes described by Dr. Klunzinger were obtained in 1871; and since 1887 the Museum has been enriched by periodical consignments of the fishes of *Muscat* collected by Surgeon-Major A. S. J. Jayakar.

The two Indian ichthyologists, Dr. Bleeker * and Mr. Francis Day, made large and valuable contributions at various times—the former of species inhabiting the *Archipelago*, the latter of those of the *Continent of India*. Of other Indian and Indo-Pacific collections may be mentioned those from *North-Eastern Bengal* made by the late Mr. T. C. Jerdon (1872), from *Burma* by Sgr. Fea (1893), from the *Shan States* by Mr. E. W. Oates (1894), from *Mauritius* by V. de Robillard (1882 *et seq.*), from *Madras* (1888), *Sumatra* (1890), *Singapore* (1883), *Borneo*, sent by H.H. Rajah Brooke, Mr. C. Hose, and Mr. A. H. Everett (1893–94), *Celebes* by Dr. A. B. Meyer (1871).

From the *Southern Pacific* collections reached the Museum through the late Mr. J. L. Brenchley (1871), the Godeffroy Museum, and the Rev. S. J. Whitmee (1874). From *Australia* few but large contributions were received from the late Mr. G. Krefft (1870), the Sydney

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* Dr. C. L. Reuvens ('Notes from the Leyden Museum,' xvi. 1894, p. 146) observes "that, after Bleeker's death, the Leyden Museum bought in 1879 the whole collection made by this eminent ichthyologist for his own study," and "that these collections were the base for all his ichthyological treatises." This is not quite correct. Years before 1879 I bought of Dr. Bleeker, for the British Museum, the types of the Reptiles described by him, as well as series of the species of Fishes belonging to families successively described by him in the 'Atlas Ichthyologique,' the understanding being that these series should include the original specimens from which the first description of the new species had been taken. This was carried out by Dr. Bleeker for the first four volumes of the 'Atlas,' as is not only evident from his own letters referring to these transactions, but from the fact that these series include *unica*, such as *Pseudoscarus strongylocephalus*, *microcheilus*, *xanthopleura*, *troscheli*, *Acrochordichthys platycephalus*, and many others.

In 1872 Dr. Bleeker informed me of his intention to offer to the British Museum, from the remainder of his collection, only those species of which he had more than two specimens. As this offer no longer included the types, or even absolutely authenticated specimens, I did not avail myself of it, and consequently the British Museum does not contain any types of the families described by him in the later volumes of the 'Atlas.'

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Museum (1871), and the Imperial Institute (1891). The late Mr. Morton Allport sent very complete collections from *Tasmania* (1871), and the New Zealand Institute similar series from that Colony (1872).

The *Hawaiian* Government presented the whole collection sent to the Fisheries Exhibition in 1883; whilst the Smithsonian Institution contributed a series of the marine fishes from the *Pacific Coasts of the United States* in 1881.

A series of *Lake Erie* fishes was secured in 1876, and numerous large collections from all the large river-systems of *Western Canada* and the *United States* were received from the Smithsonian Institution and Professors A. Agassiz, D. S. Jordan, and C. Eigenmann (1880–92).

Important contributions to the Fish Fauna of *Central America* were made by Mr. O. Salvin (1875), Mr. Forrer (1881), Mr. F. D. Godman (1883), the National Museum of Mexico (1894), and by purchase (1892).

The *South American* series was enriched by Prof. A. Agassiz (1890), and by the Copenhagen Museum, from which a collection from the *Rio das Velhas* was received (1876). The Warsaw Museum communicated a collection from *High Peru* (1875), and Professor Lataste one from *Chili* (1894). Other collections were purchased: one from *Surinam* (1870), one from the *Rio Negro* (1893), one from *Paraguay* (1894), one from the *Rio Parana* (1872), and two from the *Rio de la Plata* (1878).

The Government of *Jamaica* presented the whole collection sent to the Fisheries Exhibition in 1883; the late Mr. J. Mathew Jones the specimens collected by him in *Bermuda*, and Professor Rein those from *Morocco*.

Frequent, though small as regards numbers, were accessions from the freshwaters of *West Africa*, the more important being those received from the *Gaboon* (1872), from *Angola* through the late Mr. J. J. Monteiro (1873), and from the *River Niger* through the late Mr. W. A. Forbes (1884).

Owing to the difficulty of transport, especially of spirit of wine, collections from the *Central* and *East African Lakes* have hitherto been few and far between: for fishes from *Lake Nyassa* the Museum is indebted to Mr. H. H. Johnston, for those from *Lake*

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*Tanganyika* to Mr. Coode Hore; whilst Mr. F. J. Jackson collected in the *Kilimanjaro* and Dr. Gregory in the *Mount Kenia* region. The fishes of the Victoria Nyanza are still a great desideratum.

These acquisitions, registered since the completion of the First Edition of the 'Catalogue,' with many more of smaller extent, amount to 29,267 specimens, which, added to the 29,275 specimens previously obtained, bring up the Collection in the British Museum to 58,542 specimens at the present date.

Thus the materials available for the purposes of this Second Edition have grown to twice the extent of those which were accessible to the author of the First Edition, and by their greater completeness will essentially aid in bringing the work up to the standard of the present state of our knowledge of Ichthyology. It is also satisfactory to notice the disappearance from the systematic list of the incubus of "doubtful" species. In 1859 ichthyological literature was overburdened with imperfectly or incorrectly characterized species, of which, in the meantime, the typical specimens have been reexamined or redescribed by competent zoologists—some by the author of the present volume himself. They have now found their place either in the system or synonymy.

Unfortunately for Descriptive Ichthyology there still remain a number of the older species the types of which have not been preserved or cannot be recognized, forming one of the causes of the divergence of authors' opinions as regards the limitation of species and the names which they should bear. Whether the strict application of the law of priority, which is so strongly advocated in the modern rules of zoological nomenclature, and adopted by the author of this volume, and by which the most worthless productions are placed on the same level with the classical works of the founders of Ichthyology, will prove a benefit to science, may be questioned.

Finally, it should be mentioned that some of the plates with which it was originally intended to illustrate the first volume of the First Edition were actually drawn on stone by G. H. Ford, and printed.

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Two of them (Plates III. and IV.) could be utilized for the present volume; but as the number of copies printed was insufficient for this edition, 200 additional ones had to be reproduced by the collotype process. Although the result is quite satisfactory, these later prints are inferior in beauty to Ford's original work.

It is hoped that this Second Edition will witness as rapid a progress of Ichthyology, and as efficiently aid in it, as its predecessor.

ALBERT GÜNTHER,
*Keeper of the Department of Zoology.*

British Museum (N.H.),
February 26, 1895.

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# INTRODUCTION.

When the preparation of a new edition of the First Volume of the Catalogue of Fishes was decided upon I was desired to begin the work with the Perciformes, the further subdivision of the group being left to my discretion.

I have endeavoured to establish the families on a firmer basis than had hitherto been done, and with this object I have devoted special attention to osteological characters, hitherto too much neglected. A large number of skeletons which, thanks to the skill of Mr. Grönvold, leave nothing to be desired, have been specially prepared, and have enabled me to study the bony structure of at least one species of most of the genera. This investigation has resulted in a more rigid definition of the higher groups, and, as I am convinced, in a more natural coordination of their contents.

The numerous figures in the text, executed with the greatest care by Mr. J. Green, will sufficiently explain the osteological terms employed in the definition of families and genera.

As regards the method of describing, the following explanations are necessary :—

The formula which heads the description of the species refers to the number of dorsal and anal rays and of scales. Thus " D. VI–VII 13–15. A. VI 17–18 " signifies that the dorsal fin (D) is composed of six or seven (VI–VII) spines and thirteen to fifteen (13–15) soft rays, and the anal (A) of six (VI) spines and seventeen or eighteen (17–18) soft rays. The last soft ray of the dorsal and anal is often cleft to the base, and is by some authors counted as two; but, being supported by a single interneural, it is here reckoned as one. The interposition of a comma between the roman and arabic numerals signifies that the spinous portion of the fin is distinct from the soft. The number of scales " Sc. 46–53 $\frac{6-7}{14-16}$; l. l. 43–46 " is counted first in a longitudinal series above the lateral line (46 to 53), from above

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the origin of the latter to the base of the caudal fin; then in a transverse line extending from the spinous dorsal to the lateral line ($\frac{6 \text{ or } 7}{}$) and from the lateral line to the mid-ventral line ($\frac{}{14 \text{ to } 16}$): unless otherwise stated, that point of the lateral line is chosen for counting the transverse series of scales which approaches nearest the spinous dorsal. Under "l. l." the number of pierced scales is given which form the lateral line or series of muciparous scales. In some instances the lateral line extends on the caudal fin; these additional crypts are not counted in the formula.

The "total length," in the discussion of the proportions, is exclusive of the caudal fin, which there is no more reason to include in the length than the dorsal and anal fins in the depth of the body; but in giving the size of the fish (from the largest specimen in the collection) the length includes the middle caudal rays. The length of the head, in the description of the proportions of the constituent parts, is measured from the end of the snout to the extremity of the bony opercle or of the longest opercular spine. Unless specially mentioned, the mandible, in such fish as have a projecting chin, is not reckoned in the length of the head. Very young specimens are, for obvious reasons, usually left out of consideration in the description of the proportions of the various parts.

The gill-rakers, counted on the lower part of the anterior arch, are usually preceded by some rudimentary knob-like ones; unless the contrary be stated, these rudiments are included in the total number.

The genera with which the present volume deals have received much attention since the publication of the First Edition in 1859. Many of the type specimens of the species too briefly described in the great work of Cuvier and Valenciennes have been identified or recharacterized by Prof. Vaillant, Dr. Sauvage, and Prof. Jordan; the remainder I have myself examined in the Paris Museum. A number of the types of Bloch's descriptions have been the subject of notes by the late Prof. Peters. The excellent papers published by the late Prof. Poey, and the 'Atlas Ichthyologique' of Bleeker, have made us better acquainted with the numerous Caribbean and Malayan forms previously described by these authors. But it is especially in North American ichthyology, which was in an utterly confused state when the First Edition of this work was prepared,

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and when no materials were available in any European Museum, that the greatest progress has been made, thanks chiefly to the untiring energy of Prof. Jordan and his associates Prof. Gilbert and Prof. Eigenmann. All this excellent work of revision of the earlier systematic attempts has greatly facilitated my task.

Notwithstanding the very numerous valid species which have been described in the course of the last 35 years, the net increase in the number of recognized species is small as compared with the First Edition of this work. My revision has resulted in such a reduction as to almost counterbalance the additions. Thus the corresponding part of the First Edition enumerates as many as 393 species, of which, however, only 317 were considered as apparently well characterized. I have to show a list of only 375 species; of these 261 are represented in the Collection, by 2353 specimens. The number of specimens enumerated in the First Edition was only 774, some of which have since been eliminated as defective or duplicates.

I am indebted to Prof. Jordan for many notes on the North American *Percidæ*, and to Prof. Eigenmann for most obligingly supplying a number of desiderata during the preparation of this volume. My old friend Prof. Lataste has collected specially for this work the fresh-water Perches of Chili. Prof. Vaillant has given me every facility for the study of the specimens under his charge in the Paris Museum, and has besides kindly supplied me with information respecting them. To these gentlemen I beg to express my hearty thanks.

The symbols in the third column of the list of specimens signify :— "[P.]"="Presented by;" "[C.]"="Collected by;" "[E.]"="Obtained by exchange."

G. A. BOULENGER.

Zoological Department,
Jan. 26, 1895.

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# CATALOGUE

OF

# TELEOSTEAN FISHES.

—•—

## Suborder ACANTHOPTERYGII.

Parietal bones separated by the supraoccipital; præmaxillary bones distinct from the maxillaries and forming the border of the upper jaw; opercles well developed. Gills pectinate. Pectoral arch suspended from the cranium. No interclavicles. Ventral fins usually thoracic or jugular. Part of the rays of the dorsal and anal fins usually not articulated, forming spines. Air-bladder, if present, usually without pneumatic duct.

This Suborder, comprising most of the true Acanthopterygians of Cuvier, corresponds to the *Physoclisti Eleutherognathi* of later authors.

### Division 1. PERCIFORMES.

No bony stay for the præopercle. Spinous dorsal well developed. None of the epipleural bones attached to the centra of the vertebræ. Ventrals thoracic, with five (rarely four) branched rays. Pectorals with the pterygials longer than broad, more or less regularly hourglass-shaped.



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# Fam. 1. CENTRARCHIDÆ.

No subocular lamina of the suborbitals; entopterygoid present. Præcaudal vertebræ with transverse processes from the third or fourth to the last; ribs, all but the last or last two to four sessile, inserted on the centrum, behind the transverse processes. Two nostrils on each side. Gill-membranes free from isthmus; five to seven branchiostegals; gills four, a slit behind the fourth; pseudobranchiæ more or less developed, often rudimentary, or absent. Pharyngeal bones separate. Soft portion of dorsal fin not more developed than the anal; latter with three or more spines.

The maxillary bone is exposed, its distal extremity not slipping under the first suborbital; a supplemental bone is present in the large-mouthed forms, except in *Kuhlia*. Frontals with a pair of large muciferous channels, which in the North-American genera converge posteriorly, or are confluent with a transverse channel connecting the postfrontals, their posterior openings close together on the median line in front of the supraoccipital crest. Palate toothed. The shape of the body varies from elongate, perciform, to short and deep, chætodontiform, with the dorsal and anal fins depressible into a more or less developed groove or sheath; the spinous and soft portions of the dorsal fin united, or at least completely connected at the base, subequal in length, or either the one or the other the longer. Scales small or large, smooth or ciliated; lateral line, if present, with straight tubules, not extending on the caudal fin; it is interrupted in some *Apomotis*, absent in *Elassoma*. 10 to 18 præcaudal and 14 to 17 caudal vertebræ, 25 to 33 altogether. In order to show at a glance the principal variations in the vertebral column, the characters observed in the skeletons in the Collection are tabulated in eight columns, as follows:—

A. Total number of vertebræ.
B. Præcaudal vertebræ.
C. Ribless anterior vertebræ, bearing only epipleurals.
D. Vertebræ with sessile ribs and no transverse processes (parapophyses).
E. Vertebræ with sessile ribs and transverse processes.
F. Vertebræ with ribs attached to transverse processes.
G. Præcaudal vertebræ with the transverse processes united to form a closed hæmal arch, with or without hæmal spine.
H. Caudal vertebræ. (That vertebra is taken as the first caudal that shows the hæmal arch developed exactly as in the vertebræ following it, without any wing-like lateral enlargement or process. According to this method of distinction, the first interhæmal will often be found attached to the last præcaudal vertebra.)

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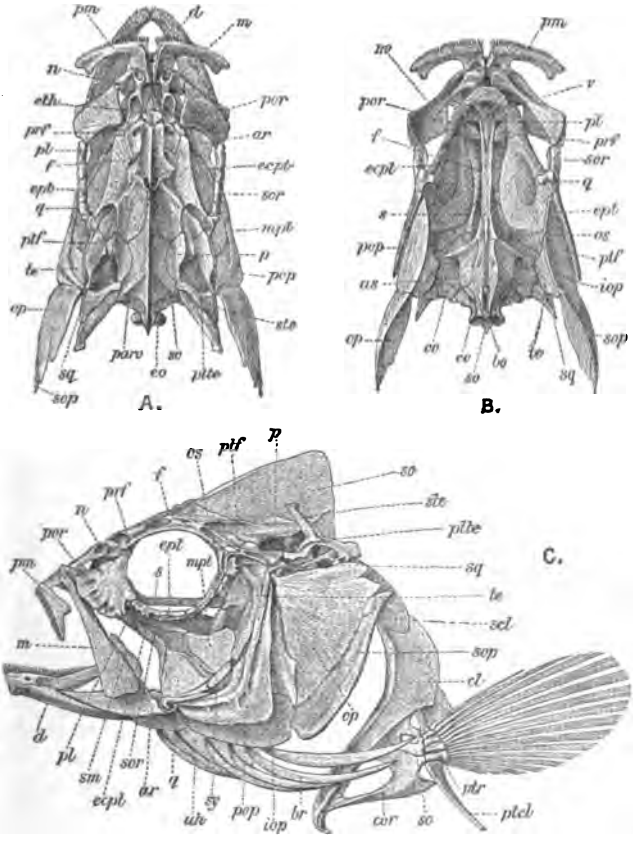


Fig. 1.—*Ambloplites rupestris.*

A. Upper view of skull. B. Lower view of skull. C. Side view of skull and pectoral arch.

| | | | | | |
|---|---|---|---|---|---|
| *ar.* | Articular. | *n.* | Nasal. | *q.* | Quadrate. |
| *as.* | Prootic. | *oo.* | Opisthotic. | *s.* | Parasphenoid. |
| *bo.* | Basioccipital. | *op.* | Opercular. | *sc.* | Scapula. |
| *br.* | Branchiostegal. | *os.* | Orbitosphenoid. | *scl.* | Supraclavicle. |
| *cl.* | Clavicle. | *p.* | Parietal. | *sm.* | Supplemental maxillary. |
| *cor.* | Coracoid. | *paro.* | Paroccipital (Epiotic). | *so.* | Supraoccipital. |
| *d.* | Dentary. | *pl.* | Palatine. | *sop.* | Subopercular. |
| *ecpt.* | Ectopterygoid. | *pm.* | Præmaxillary. | *sor.* | Suborbital. |
| *eo.* | Exoccipital. | *pop.* | Præopercular. | *sq.* | Squamosal. |
| *ept.* | Entopterygoid. | *por.* | Præorbital. | *s'c.* | Supratemporal. |
| *eth.* | Ethmoid. | *prf.* | Præfrontal. | *sy.* | Symplectic. |
| *f.* | Frontal. | *ptcl.* | Postclavicle. | *te.* | Temporal (Hyomandibular). |
| *iop.* | Interopercular. | *ptf.* | Postfrontal. | *uh.* | Urohyal. |
| *m.* | Maxillary. | *ptr.* | Pterygial. | *v.* | Vomer. |
| *mpt.* | Metapterygoid. | *ptte.* | Posttemporal. | | |



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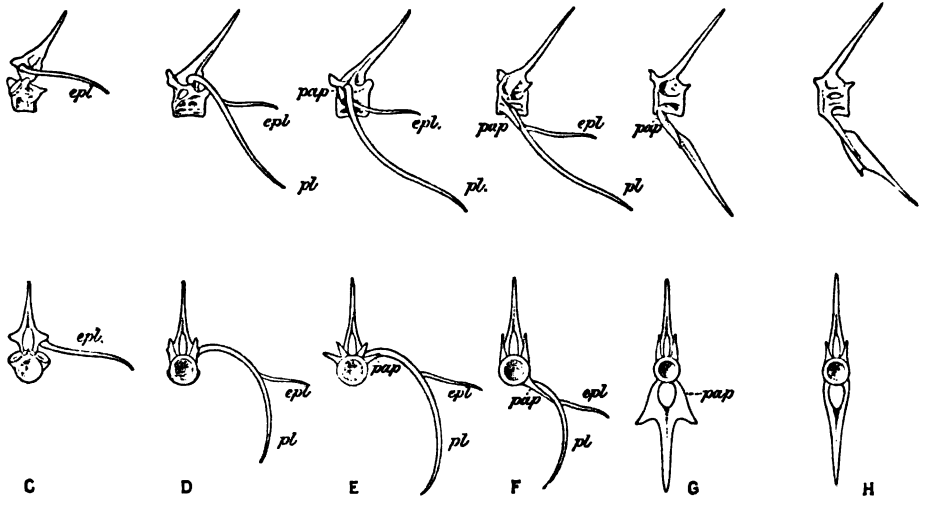


Fig. 2.—Vertebræ of *Micropterus dolomiei*.
Side view and front view.
C. 1st vertebra; D. 3rd; E. 5th; F. 13th; G. 16th; H. 17th.
*pap.* Transverse processes; *pl.* Ribs; *epl.* Epipleurals.

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These six types of vertebræ (C–H) are represented on the figure on the opposite page.

| | A. | B. | C. | D. | E. | F. | G. | H. |
|---|---|---|---|---|---|---|---|---|
| *Pomoxys sparoides* | 33 | 18 | 2 | 1 | 11 | 1 | 4 | 15 |
| *Centrarchus macropterus* | 31 | 15 | 2 | 1 | 9 | 2 | 2 | 16 |
| *Ambloplites rupestris* | 31 | 15 | 2 | 1 | 9 | 2 | 2 | 16 |
| —— *interruptus* | 31 | 14 | 2 | 1 | 9 | 1 | 1 | 17 |
| *Chænobryttus gulosus* | 29 | 13 | 2 | 0 | 8 | 2 | 1 | 16 |
| *Micropterus dolomieï* | 32 | 16 | 2 | 1 | 9 | 3 | 1 | 16 |
| —— *salmonoides* | 33 | 16 | 2 | 1 | 10 | 2 | 1 | 17 |
| *Apomotis cyanellus* | 29 | 13 | 2 | 1 | 7 | 2 | 1 | 16 |
| *Lepomis auritus* | 30 | 14 | 2 | 1 | 7 | 3 | 2 | 16 |
| *Eupomotis pallidus* | 29 | 13 | 2 | 1 | 8 | 2 | 1 | 16 |
| —— *gibbosus* | 30 | 13 | 2 | 1 | 8 | 1 | 1 | 17 |
| *Elassoma evergladii* | 25 | 10 | ... | ... | ... | ... | ... | 15 |
| *Kuhlia rupestris* | 25 | 11 | 2 | 1 | 5 | 2 | 4 | 14 |
| —— *malo* | 25 | 10 | 2 | 0 | 5 | 3 | 3 | 15 |

Only the first pterygial is in contact with the coracoid.

The air-bladder is constantly present.

Carnivorous, fresh-water fishes, some entering brackish water. Many are known to build nests. Mostly inhabitants of North America. The genus *Kuhlia* is irregularly distributed over East and South Africa, the North Coast of Australia, and the islands of the Indian and Pacific Oceans.

The mode of attachment of the ribs distinguishes the fishes of this family from the *Percidæ* and *Serranidæ*, their nearest allies, as a glance at columns D, E, and F of the tables on pages 43 and 115 will show. They are further distinguished from the *Percidæ* by the number of anal spines, and from the *Serranidæ* by the absence of a suborbital lamina supporting the globe of the eye.

### *Synopsis of the Genera.*

I. Pseudobranchiæ not much developed, rudimentary, or absent.

A. Dorsal and anal fins nearly equally developed; anal spines 6 to 8; mouth moderate or large, with well-developed supplemental maxillary bone; palatine and entopterygoid bones toothed.

Mouth large; ectopterygoids toothless; dorsal fin not longer than anal ..... 1. POMOXYS, p. 6.

Mouth moderate; ectopterygoids toothed; dorsal fin a little longer than anal .... 2. CENTRARCHUS, p. 8.

B. Dorsal fin much longer than anal.

1. Anal spines 5 to 8; mouth large, with well-developed supplemental maxillary bone; palatines, entopterygoids, and ectopterygoids toothed ..... 3. AMBLOPLITES, p. 9.

2. Anal spines 3 (rarely 4); lateral line present.

*a*. Mouth large, with well-developed supplemental maxillary bone; palatines toothed.

Entopterygoids and ectopterygoids toothed; body short ..... 4. CHÆNOBRYTTUS, p. 13.

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Entopterygoids and ectopterygoids toothless; body elongate..... 5. MICROPTERUS, p. 14.

*b*. Mouth moderate or small; supplemental maxillary bone small or absent; entopterygoids and ectopterygoids toothless; palatines toothless or with a few teeth.

Supplemental maxillary perfectly distinct; pectoral fin obtuse ..... 6. APOMOTIS, p. 18.
Supplemental maxillary absent or reduced to a slight rudiment; pectoral fin obtuse 7. LEPOMIS, p. 23.
Supplemental maxillary absent; pectoral fin acutely pointed ..... 8. EUPOMOTIS, p. 28.

3. Anal spines 3; dorsal spines 4 or 5; lateral line absent; no supplemental maxillary bone; gill-membranes broadly united across isthmus ..... 9. ELASSOMA, p. 34.

II. Pseudobranchiæ large; no supplemental maxillary bone; mouth large; palatine, entopterygoid, and ectopterygoid bones toothed; anal spines 3..... 10. KUHLIA, p. 35.

## 1. POMOXYS.

Pomoxis, *Rafin. Journ. Ac. Philad.* i. 1818, p. 417; *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 298; *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 216; *Bleek. Arch. Néerl.* xi. 1876, p. 248; *Jord. Proc. Ac. Philad.* 1877, p. 60; *Jord. & Gilb. Syn. Fish. N. Am.* p. 464 (1882).

Centrarchus, part., *Cuv. & Val.* iii. p. 84 (1829); *Günth. Cat.* i. p. 256 (1859).

Hyperistius, *Gill, Amer. Journ. Sc.* (2) xxxvii. 1864, p. 92; *Cope, l. c.*

Body short, elevated, strongly compressed; scales large, cycloid or feebly ciliated. Lateral line complete, the tubes straight and extending at least on the anterior half of the exposed surface of the scale. Mouth large, protractile; maxillary exposed, with large supplemental bone; teeth in jaws in narrow villiform bands; teeth on vomer, palatines, entopterygoids, and tongue; head partly naked; præorbital and præopercle finely serrated; opercle ending in two obtuse points. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present, small, sometimes rudimentary; gill-rakers very long and slender. Dorsal fin single, the spinous portion shorter than the soft, with VI–VIII 13–15 rays. Anal as much developed as the dorsal, with VI 17–18 rays. Caudal feebly emarginate. Pectorals rounded or obtusely pointed, with 15 or 16 rays, upper longest. Ventrals below the pectorals, close together, with a strong spine. Posterior processes of the præmaxillaries not extending to the frontals; supraoccipital and parietal crests very strong, produced forwards on the frontals to between the orbits. Vertebræ 33 (18+15).

North America.

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## 1. Pomoxys sparoides.

Labrus sparoides, *Lacép. Poiss.* iii. p. 717, pl. xxiv. fig. 2, and iv. p. 717 (1802).
Pomoxis annularis, *Rafin. Journ. Ac. Philad.* i. 1818, p. 417; *Jord. & Gilb. Syn. Fish. N. Am.* p. 464 (1882); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. clix. (1884); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 560 (1891).
Centrarchus sparoides, *Cuv. & Val.* iii. p. 88, pl. xlviii. (1829).
Centrarchus hexacanthus, *Cuv. & Val.* vii. p. 458 (1831); *Kirtland, Boston Journ. N. H.* iii. 1841, p. 480, pl. xxix. fig. 2; *Günth.* i. p. 257 (1859).
Cichla storeria, *Kirtland, Rep. Zool. Ohio*, p. 191 (1838).
Pomoxis nitidus, *Girard, Proc. Ac. Philad.* 1857, p. 200, *and Rep. U.S. Explor. R. R.* x. pt. iv. p. 6, pl. ii. figs. 5–8 (1859).
Pomoxis sparoides, *Girard, Rep.* p. 6; *Jord. & Gilb. l. c.* p. 465; *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 321; *Goode, l. c.* pl. clx., *and Amer. Fish.* p. 68, fig. (1888); *Bollman, l. c.*
Pomoxis nigromaculatus, *Girard, l. c.*
Centrarchus nitidus, *Günth.* i. p. 257.
Pomoxis hexacanthus, *Holbr. Ichth. S. Carol.* p. 39, pl. vi. fig. 1 (1860).
Pomoxys brevicauda, *Gill, Proc. Ac. Philad.* 1865, p. 64.
Pomoxys intermedius, *Gill, l. c.* p. 65.
Pomoxys storerius, *Gill, l. c.*
Pomoxys protacanthus, *Gill, l. c.* p. 66.
Hyperistius hexacanthus, *Cope, Proc. Ac. Philad.* 1865, p. 84.

D. VI–VII (rarely VIII) 13–15. A. VI 17–18.
Sc. 46–53 $\frac{6-7}{14-16}$; l. l. 43–46.

Depth of body 2⅓ to 2½ times in total length, length of head 3 times; upper profile of head concave. Lingual teeth in a single patch; entopterygoid teeth in small patches. Snout as long as or a little longer than diameter of eye, which is 4 to 4⅓ times in length of head; interorbital width 4⅓ to 5 times in length of head; lower jaw projecting; maxillary extending to below centre or posterior third of eye, the width of its distal extremity ⅔ to ¾ diameter of eye; cheeks and opercles scaly. About 25 gill-rakers on lower part of anterior arch. Dorsal originating midway between end of snout and base of caudal fin; spines gradually increasing in size, first very short, last nearly half length of head and about ¾ length of soft rays. Pectoral about ⅔ length of head. Ventrals extending nearly to origin of anal. Anal spines gradually increasing in size, last about ⅔ length of head and ⅖ to ⅔ length of longest soft rays. Silvery to pale olive, spotted, marbled or irregularly cross-barred with dark olive or green; vertical fins with or without dark lines surrounding round yellow spots.

Total length 270 millim.

North America east of the Rocky Mountains.

| | | |
|---|---|---|
| *a, b, c, d, e.* Ad., hgr., & yg., skins. | Lake Erie. | Parnell Coll. |
| *f.* Ad. | New York. | Smithsonian Instit. |
| *g.* Ad. | Wilmington, N. Carolina. | Smithsonian Instit. |

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| | | |
|---|---|---|
| *h.* Ad. | White R., Indiana. | Prof. D. S. Jordan [E.]. |
| *i.* Hgr. | Bean Blossom Creek, Monroe Co., Indiana. | Prof. Eigenmann. |
| *k–o.* Yg. | Gosport, Monroe Co., Indiana. | Prof. Eigenmann. |
| *p–r.* Yg. | N. America. | |
| *s.* Ad., skel. | Canada. | Officers of the Chatham Mus. [P.]. |

## 2. CENTRARCHUS.

Centrarchus, part., *Cuv. & Val.* iii. p. 84 (1829); *Günth. Cat.* i. p. 256 (1859).

Centrarchus, *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 298; *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 216; *Bleek. Arch. Néerl.* xi. 1876, p. 249; *Jord. Proc. Ac. Philad.* 1877, p. 60; *Jord. & Gilb. Syn. Fish. N. Am.* p. 463 (1882).

Body short, elevated, strongly compressed; scales large, ciliated. Lateral line complete, the tubes straight and occupying at least the anterior half of the exposed surface of the scale. Mouth moderate, protractile; maxillary exposed, with well-developed supplemental bone; teeth in jaws in narrow villiform bands; teeth on vomer, palatines, entopterygoids, ectopterygoids, and tongue; head partly naked; præorbital and præopercle finely serrated; opercle ending in two obtuse points. Gill-membranes separate; six branchiostegals; pseudobranchiæ present, small; gill-rakers very long and slender. Dorsal fin single, the spinous portion much longer than the soft, with XI–XIII 12–14 rays. Anal a little shorter than dorsal, with VII–VIII 15 rays. Caudal feebly emarginate. Pectorals obtusely pointed, with 14 or 15 rays, upper longest. Ventrals below the pectorals, close together, with a strong spine. Posterior processes of the præmaxillaries extending nearly to the frontals; frontals posteriorly with a transverse ridge, connecting the parietal and supraoccipital crests, which are very strong and extend forwards to between the orbits. Vertebræ 31 (15+16).

North America.

### 1. Centrarchus macropterus.

Labrus macropterus, *Lacép. Poiss.* iii. p. 477, pl. xxiv. fig. 1 (1802).

Labrus irideus, *Lacép. op. cit.* iv. p. 716 (1802).

Centrarchus irideus, *Cuv. & Val.* iii. p. 89 (1829); *Holbr. Ichth. S. Carol.* p. 18, pl. iii. fig. 1 (1860); *Günth.* i. p. 257 (1859); *Cope, Proc. Am. Philos. Soc.* xi. 1870, p. 451; *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 30.

Centrarchus sparoides, *Cuv. & Val.* vii. p. 458 (1831).

Centrarchus macropterus, *Jord. l. c.*; *Jord. & Gilb. Syn. Fish. N. Am.* p. 463 (1882); *Goode, Fish. & Fisher. Ind. U.S.* i. pl. clviii. (1884); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 559 (1891).

D. XI–XIII 12–14. A. VII–VIII 15. Sc. 43–45 $\frac{5-6}{14-15}$; l. l. 37–42.

Depth of body twice in total length, length of head 3 times.

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Lingual teeth in two patches; entopterygoid teeth in rather large patches. Snout about $\frac{2}{3}$ diameter of eye, which is 3 times in length of head, and equals interorbital width; lower jaw projecting; maxillary extending to below anterior third of eye, the width of its distal extremity about half diameter of eye; cheeks and opercles scaly. About 30 gill-rakers on lower part of anterior arch. Dorsal originating above base of pectoral; spinous portion about $\frac{2}{3}$ the length of the soft; spines gradually increasing in size, the last nearly $\frac{2}{3}$ length of head and a little shorter than the soft rays. Pectoral as long as head or a little shorter. Ventrals extending to third or fourth anal spine. Spinous portion of anal about $\frac{2}{3}$ the length of the soft; the rays nearly as long as in the dorsal. Olive or green, with dark brown spots on the sides, which may form interrupted streaks along the series of scales; a blackish opercular spot; young with a large black-and-white ocellus on the soft portion of the dorsal.

Total length 165 millim.

United States east of the Mississippi, northwards to Southern Illinois and North Carolina.

| | | |
|---|---|---|
| *a*, *b*. Ad. & hgr. | N. Carolina. | Smithsonian Instit. |
| *c*. Yg. | Dismal Swamp, Suffolk, Virginia. | U.S. Fish Commission. |

## 3. AMBLOPLITES.

Ambloplites, *Rafin. Ichth. Oh.* p. 33 (1820); *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 299; *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 216; *Bleek. Arch. Néerl.* xi. 1876, p. 249; *Jord. Proc. Ac. Philad.* 1877, p. 60; *Jord. & Gilb. Syn. Fish. N. Am.* p. 466 (1882).

Centrarchus, part., *Cuv. & Val.* iii. p. 84 (1829); *Günth. Cat.* i. p. 256 (1859).

Archoplites, *Gill, Proc. Ac. Philad.* 1861, p. 165; *Jord. & Gilb. l. c.* p. 465.

Acantharchus, *Gill, Amer. Journ. Sc.* (2) xxxvii. 1864, p. 92; *Bleek. l. c.*; *Jord. l. c.*; *Jord. & Gilb. l. c.* p. 468.

Body short, rather elevated, compressed; scales large, all or part ciliated. Lateral line complete, the tubes straight and occupying at least the anterior half of the exposed surface of the scale. Mouth large, protractile; maxillary exposed, with large supplemental bone; teeth in jaws in broad villiform bands, the inner depressible, hinged at the base; teeth on vomer, palatines, entopterygoids, ectopterygoids, and tongue; head partly naked, unarmed, or præorbital and præopercle denticulate or finely serrate; opercle ending in two obtuse points. Gill-membranes separate; six or seven branchiostegals; pseudobranchiæ rudimentary or absent; gill-rakers elongate. Dorsal fin single, the spinous portion much longer than the soft, with XI–XIII 10–12 rays. Anal much shorter than dorsal, with V–VII 9–11 rays. Caudal truncate or feebly emarginate. Pectorals obtusely pointed, with 14 or 15 rays, upper longest. Ventrals

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below the pectorals, close together, with a strong spine. Posterior processes of the præmaxillaries not extending to the frontals; frontals posteriorly with a transverse ridge, connecting the parietal and supraoccipital crests, which are very strong and extend forward to between the orbits. Vertebræ 31 (14–15+16–17).

North America.

*Synopsis of the Species.*

| | |
|---|---|
| Patches of entopterygoid teeth large; lingual teeth in a single patch; scales mostly ciliated, 42–50 $\frac{6}{13-17}$ | 1. *rupestris*, p. 10. |
| Patches of entopterygoid teeth small; lingual teeth in a single patch; scales mostly cycloid, 43–45 $\frac{6}{13-15}$ | 2. *pomotis*, p. 11. |
| Patches of entopterygoid teeth small; lingual teeth in two patches; scales mostly ciliated, 50–56 $\frac{7-9}{18-21}$ | 3. *interruptus*, p. 12. |

### 1. Ambloplites rupestris.

Bodianus rupestris, *Rafin. Amer. Monthly Mag.* 1817, p. 120.
Icthelis erythrops, *Rafin. Ichth. Oh.* p. 29 (1820).
Lepomis ictheloides, *Rafin. l. c.* p. 32.
Cichla ænea, *Lesueur, Journ. Ac. Philad.* ii. 1822, p. 214, pl. —.
Centrarchus æneus, *Cuv. & Val.* iii. p. 84 (1829); *Richards. Faun. Bor.-Amer.* iii. p. 18, pl. lxxv. (1836); *De Kay, N. York Faun., Fish.* p. 27, pl. ii. fig. 4 (1842); *Kirtland, Boston Journ. N. H.* iv. 1844, p. 239, pl. xi. fig. 1; *Günth.* i. p. 256 (1859).
Centrarchus pentacanthus, *Cuv. & Val. t. c.* p. 88.
Ambloplites æneus, *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 299.
Ambloplites ichtheloides, *Agass. l. c.*
Ambloplites rupestris, *Gill, Proc. Ac. Philad.* 1860, p. 20; *Jord. & Gilb. Syn. Fish. N. Am.* p. 466 (1882); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. cxlix. (1884), *and Amer. Fish.* p. 68, fig. (1888); *Bollman, Rep. U.S. Fish. Comm. f.* 1888, p. 561 (1891).
Ambloplites cavifrons, *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 217.

D. X–XI 11–12. A. V–VII 9–11. Sc. 42–50 $\frac{6}{13-17}$; l. l. 40–45.

Depth of body 2 to 2½ times in total length, length of head 2¾ to 3 times. Lingual teeth in a single patch; entopterygoid teeth in large patches. Snout as long as or a little longer than diameter of eye, which is 3 to 4 times in length of head; interorbital width 4 times in length of head; maxillary extending to below centre or posterior third of eye, the width of its distal extremity ½ to ⅔ diameter of eye; præorbital and præopercle more or less distinctly denticulate; cheeks and opercles scaly. Gill-rakers stout, 6 or 7, and several rudiments, on lower part of anterior arch. Dorsal originating above axilla; spinous portion nearly twice as long as the soft; spines increasing in length to the fifth or sixth, which is ⅓ to ⅖ length of head, and ⅗ to ⅔ length of longest soft rays. Pectoral ½ to ⅗ length of head. Anal spines gradually increasing in size and nearly as much developed as the dorsals. Caudal feebly

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emarginate. Scales mostly ciliated. Pale bronzy or olive-green, with more or less numerous dark spots which may form longitudinal lines following the series of scales; a blackish opercular spot; vertical fins with dark mottlings.

Total length 250 millim.

North America east of the Rocky Mountains.

| | | |
|---|---|---|
| *a–d.* Ad. & yg. | Montreal. | |
| *e.* Hgr. | Canada. | Officers of the Chatham Mus. [P.]. |
| *f, g, h.* Ad., skins. | Lake Erie. | Parnell Coll. |
| *i–k.* Ad. | Toledo, Lake Erie. | |
| *l.* Ad. | Buffalo, New York. | Smithsonian Instit. |
| *m.* Ad. | Sandusky, Ohio. | Smithsonian Instit. |
| *n.* Ad. | Bay View, Michigan. | Prof. Eigenmann [C.]. |
| *o.* Yg. | Red Lake R., Crookston, Minnesota. | Prof. Eigenmann [C.]. |
| *p–s.* Hgr. & yg. | Cedar Bluffs, Monroe Co., Indiana. | Prof. Eigenmann [C.]. |
| *t.* Yg. | South Fork, Holston R., Tennessee. | U.S. Fish Commission. |
| *u.* Ad., skel. | Canada. | Officers of the Chatham Mus. [P.]. |

## 2. Ambloplites pomotis.

Centrarchus pomotis, *Baird, 9th Ann. Rep. Smiths. Inst.* p. 325 (1855); *Günth.* i. p. 256 (1859).

Acantharchus pomotis, *Jord. Man. Vert. N. U.S.* p. 232 (1876); *Jord. & Gilb. Syn. Fish. N. Am.* p. 469 (1882); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. cl. (1884); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 563 (1891).

D. XI–XII 10–11. A. V–VI 10–11. Sc. 43–45 $\frac{6}{13-15}$; l. l. 38–43.

Depth of body $2\frac{1}{5}$ to $2\frac{2}{3}$ times in total length, length of head $2\frac{3}{4}$ to 3 times. Lingual teeth in a single patch; entopterygoid teeth in small patches. Snout shorter than diameter of eye, which is $3\frac{1}{2}$ to $4\frac{1}{2}$ times in length of head; interorbital width $4\frac{1}{2}$ times in length of head; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præorbital and præopercle entire; cheeks and opercles scaly. Gill-rakers stout, 5, and several rudiments, on lower part of anterior arch. Dorsal originating above base of pectoral; spinous portion nearly twice as long as the soft; spines increasing in length to the fourth or fifth, which is about $\frac{1}{3}$ length of head and $\frac{1}{2}$ length of longest soft rays. Pectoral $\frac{3}{5}$ length of head. Outer ventral ray somewhat produced, reaching origin of anal. Anal spines gradually increasing in size and nearly as much developed as the dorsals. Caudal rounded. Scales mostly cycloid. Brown or dark greenish, usually with five rather indistinct darker longitudinal bands on each side; two or three horizontal dark streaks on each side of the head; a black opercular spot.

Total length 110 millim.

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Eastern United States, from Southern New York to South Carolina.

| | | |
|---|---|---|
| *a*. Ad. | Watson's Creek, New Jersey. | Smithsonian Instit. |
| *b*. Ad. | Delaware R. | Prof. D. S. Jordan [E.]. |
| *c*. Ad. | Kinston, N. Carolina. | Smithsonian Instit. |

### 3. Ambloplites interruptus.

Centrarchus interruptus, *Girard, Proc. Ac. Philad.* 1854, p. 129; *Günth.* i. p. 257 (1859).
Centrarchus maculosus, *Ayres, Proc. Calif. Acad.* i. 1854, p. 8.
Ambloplites interruptus, *Girard, Rep. U.S. Explor. R. R.* x. pt. iv. p. 10, pl. ii. figs. 1–4 (1859).
Archoplites interruptus, *Gill, Proc. Ac. Philad.* 1861, p. 165; *Jord. & Gilb. Syn. Fish. N. Am.* p. 466 (1882); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. cli. (1884); *Bollman, Rep. U.S. Fish. Comm. f.* 1888, p. 560 (1891).

D. XII–XIII 10–12. A. VI–VII 10–11. Sc. 50–56 $\frac{7-9}{18-21}$; l. l. 42–49.

Depth of body $2\frac{1}{5}$ to $2\frac{2}{5}$ times in total length, length of head $2\frac{2}{3}$ to 3 times. Lingual teeth in two patches; entopterygoid teeth in small patches. Snout as long as diameter of eye, which is 4 to 5 times in length of head and equals interorbital width; maxillary extending to below posterior border of eye, the width of its distal extremity at least $\frac{2}{3}$ diameter of eye; lower jaw projecting; præorbital, præopercle, subopercle, and interopercle finely serrated; cheeks and opercles scaly. Gill-rakers slender, 18 to 20 on lower part of anterior arch. Dorsal originating above base of pectoral; first spine very short, middle and last longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, $\frac{2}{3}$ to $\frac{3}{4}$ length of longest soft rays. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head. Ventrals reaching anus or origin of anal. Anal spines increasing in length to the last and nearly as much developed as the dorsals. Caudal feebly emarginate. Scales mostly ciliated. Olive to blackish on the back, silvery on the sides, with black blotches or with seven or eight irregular vertical bars; usually a blackish opercular spot; fins unspotted.

Total length 220 millim.

California.

| | | |
|---|---|---|
| *a–c, d–f*. Ad. & hgr. | San Francisco. | O. W. Ayres, Esq. [C.]. |
| *g*. Ad. | San Francisco. | Smithsonian Instit. |
| *h*. Ad. | Sacramento R. | Smithsonian Instit. |
| *i–k*. Ad. & hgr. | Mare Id., mouth of Sacramento R. | Prof. Eigenmann. |
| *l*. Ad., skel. | San Francisco. | O. W. Ayres, Esq. [P.]. |

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## 4. CHÆNOBRYTTUS.

Calliurus (*non Raf.*), *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 300.
Centrarchus, part., *Günth. Cat.* i. p. 256 (1859).
Bryttus, part., *Günth. t. c.* p. 258.
Chænobryttus, *Gill, Amer. Journ. Sc.* (2) xxxvii. 1864, p. 92; *Bleek. Arch. Néerl.* xi. 1876, p. 250; *Jord. Proc. Ac. Philad.* 1877, p. 59; *Jord. & Gilb. Syn. Fish. N. Am.* p. 467 (1882).
Lepomis, part., *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 219.
Glossoplites, *Jord. Man. Vert. N. U.S.* p. 229 (1876).

Body short, elevated, strongly compressed; scales large, feebly ciliated. Lateral line complete, the tubes straight and occupying the basal half of the exposed surface of the scale. Mouth large, protractile; maxillary exposed, with large supplemental bone; teeth in jaws in narrow villiform bands; teeth on vomer, palatines, entopterygoids, ectopterygoids, and tongue; head partly naked, without spines; præopercle finely serrated. Gill-membranes separate; six branchiostegals; pseudobranchiæ rudimentary; gill-rakers moderate. Dorsal fin single, the spinous portion longer than the soft, with IX–X 9–11 rays. Anal short, with III 8–10 rays. Caudal feebly emarginate. Pectorals obtusely pointed, with 15 or 16 rays, upper longest. Ventrals below the pectorals, close together, with a strong spine. Posterior processes of the præmaxillaries extending nearly to the frontals; frontals posteriorly with a transverse ridge, connecting the parietal and supraoccipital crests, which are very strong. Vertebræ 29 (13+16).

North America.

### 1. Chænobryttus gulosus.

Pomotis gulosus, *Cuv. & Val.* iii. p. 498 (1829).
Centrarchus gulosus, *Cuv. & Val.* vii. p. 459 (1831); *Günth.* i. p. 258 (1859).
Centrarchus viridis, *Cuv. & Val. t. c.* p. 460.
Calliurus gulosus, *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 300.
Calliurus punctulatus (*non Rafin.*), *Agass. l. c.*
Calliurus floridensis, *Holbr. Journ. Ac. Philad.* (2) iii. 1855, p. 53, pl. vi. fig. 1.
Calliurus melanops, *Girard, Proc. Ac. Philad.* 1857, p. 200, *and Rep. U.S. Explor. R. R.* x. pt. iv. p. 11, pl. iii. (1859).
Bryttus floridensis, *Günth.* i. p. 260.
Bryttus melanops, *Günth. l. c.*
Chænobryttus gulosus, *Cope, Proc. Ac. Philad.* 1865, p. 84; *Jord. & Gilb. Syn. Fish. N. Am.* p. 468 (1882); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. clii. (1884); *Bollman, Rep. U.S. Fish. Comm. f.* 1888, p. 562 (1891).
Lepomis gillii, *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 222.
Lepomis gulosus, *Cope, l. c.* p. 223.
Lepomis charybdis, *Cope, l. c.* p. 224.
Chænobryttus gillii, *Cope, Proc. Amer. Philos. Soc.* xi. 1870, p. 452.
Glossoplites melanops, *Jord. Man. Vert. N. U.S.* p. 233 (1876).
Glossoplites gillii, *Jord. l. c.*

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Chænobryttus floridensis, *Jord. & Copeland, Bull. Buff. Soc. N. H.* iii. 1877, p. 137.
Chænobryttus viridis, *Jord. & Copel. l. c.*; *Jord. Ann. Lyc. N. Y.* xi. 1877, p. 360.
Chænobryttus antistius, *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 88; *Jord. & Gilb. l. c.* p. 467.

D. IX–X 9–11. A. III 8–10. Sc. 40–46 $\frac{6\text{-}7}{14\text{-}15}$; l. l. 37–42.

Depth of body 2¼ to 2⅓ times in total length, length of head 2½ to 2¾ times. Lingual teeth in a single patch: entopterygoid teeth in rather large patches. Snout about as long as diameter of eye, which is 4 to 4½ times in length of head and nearly equals interorbital width; lower jaw projecting; maxillary extending to below centre or posterior third of eye, the width of its distal extremity about ⅔ diameter of eye; cheeks with small scales, opercles with larger scales. 8 or 9 gill-rakers, and several rudiments, on lower part of anterior arch, the longest about as long as gill-fringes. Dorsal originating above base of pectoral or axilla; spinous portion 1½ to 1⅔ the length of the soft; spines increasing in length to the fourth or fifth, which is about ⅔ length of head and a little shorter than soft rays. Pectoral ⅗ to ⅔ length of head. Anal spines as much developed as dorsals, third longest. Olive or green above, uniform or with small blue and red spots; a black opercular spot; three or four dark red streaks on each side of the head behind the eye.

Total length 185 millim.

United States east of the Rocky Mountains, from Lake Michigan and the Upper Mississippi to Texas and Virginia.

| | | |
|---|---|---|
| *a*. Hgr. | Rawson Lake, Michigan. | U.S. Fish Commission. |
| *b*. Ad. | Sandusky, Ohio. | Smithsonian Instit. |
| *c*. Ad. | McBean, Georgia. | Smithsonian Instit. |
| *d–e*. Ad. | N. America. | Dr. Günther [P.]. |
| *f*. Ad., skel. | White R., Indiana. | Prof. D. S. Jordan. |

## 5. MICROPTERUS.

Micropterus, *Lacép. Poiss.* iv. p. 324 (1802): *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 216; *Gill, Proc. Am. Assoc.* xxii. 1873, p. 65; *Bleek. Arch. Néerl.* xi. 1876, p. 261; *Jord. Proc. Ac. Philad.* 1877, p. 59; *Jord. & Gilb. Syn. Fish. N. Am.* p. 484 (1882); *Vaill. Miss. Sc. Mex., Poiss.* p. 139 (1883).
Calliurus, *Rafin. Ichth. Oh.* p. 26 (1820).
Aplites, *Rafin. l. c.* p. 31.
Nemocampsis, *Rafin. l. c.* p. 32.
Dioplites, *Rafin. l. c.*
Huro, *Cuv. & Val.* ii. p. 124 (1828); *Günth. Cat.* i. p. 255 (1859); *Bleek. l. c.*
Grystes, part., *Cuv. & Val.* iii. p. 54 (1829); *Günth. t. c.* p. 252.
Grystes, *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 207.

Body oblong, compressed; scales moderate or small, feebly denti-

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culate. Lateral line complete, the tubes straight and occupying the anterior half of the exposed surface of the scale. Mouth large, protractile; maxillary exposed, with large supplemental bone; teeth in jaws in broad villiform bands, the inner depressible, hinged at the base; teeth on vomer and palatines; tongue usually smooth; head partly naked, without serræ or spines. Gill-membranes separate; six (rarely seven) branchiostegals; pseudobranchiæ rudimentary; gill-rakers elongate. Dorsal fins connected at the base, with IX–X 12–15 rays, subequal or the spinous portion longer than the soft. Anal with III 10–12 rays, nearly as much developed as the soft dorsal. Caudal emarginate. Pectorals obtusely pointed, upper rays longest; 17 to 19 rays. Ventrals below the pectorals, close together, with a strong spine. Posterior processes of the præmaxillaries not extending to the frontals; frontals posteriorly with a transverse ridge connecting the parietal and supraoccipital crests, which are very strong. Vertebræ 32–33 (16+16–17).

North America.—Both species of this genus have recently been introduced in various parts of Central Europe.

### 1. Micropterus dolomiei.

Micropterus dolomieu, *Lacép. Poiss.* iv. p. 325 (1802); *Jord. Proc. U.S. Nat. Mus.* ii. 1879, p. 219; *Henshall, Black Bass*, p. 84 (1881); *Jord. & Gilb. Syn. Fish. N. Am.* p. 485 (1882); *Vaill. Miss. Sc. Mex., Poiss.* p. 142 (1883); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. cxlviii. (1884), *and Amer. Fish.* p. 54, fig. (1888); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 577 (1891).
Bodianus achigan, *Rafin. Amer. Monthly Mag.* ii. 1817, p. 120.
Calliurus punctulatus, *Rafin. Ichth. Oh.* p. 26 (1820).
Lepomis trifasciata, *Rafin. l. c.* p. 31.
Lepomis flexuolaris, *Rafin. l. c.*
Lepomis salmonea, *Rafin. l. c.* p. 32.
Lepomis notata, *Rafin. l. c.*
Etheostoma calliura, *Rafin. l. c.* p. 36.
Cichla fasciata, *Lesueur, Journ. Ac. Philad.* ii. 1822, p. 216.
Cichla ohioensis, *Lesueur, l. c.* p. 218.
Cichla minima, *Lesueur, l. c.* p. 220.
Grystes salmoides, part., *Cuv. & Val.* iii. p. 54, pl. xlv. (1829).
Centrarchus fasciatus, *Dekay, N. Y. Faun., Fish.* p. xxviii, pl. iii. fig. 9 (1842); *Kirtland, Bost. Journ. N. H.* v. 1842, p. 28, pl. ix. fig. 1; *Günth.* i. p. 258 (1859).
Centrarchus obscurus, *Dekay, l. c.* p. 30, pl. xvii. fig. 47; *Günth. l. c.*
Grystes salmoides, *Dekay, l. c.* p. 26, pl. lxix. fig. 223.
Grystes fasciatus, *Agass. Lake Superior*, p. 295 (1850).
Grystes salmonoides, part., *Günth. t. c.* p. 252.
Lepomis achigan, *Gill, Proc. Ac. Philad.* 1860, p. 20.
Micropterus fasciatus, *Cope, Proc. Ac. Philad.* 1865, p. 83.
Micropterus salmoides, *Gill, Proc. Am. Assoc.* xxii. 1873, p. 67; *Jord. Ann. Lyc. N.Y.* xi. 1877, p. 314.
Micropterus variabilis, *Vaill. l. c.*
Micropterus achigan, *Jord. Proc. U.S. Nat. Mus.* ii. 1879, p. 224; *Kilbourne & Goode, Game-Fishes U.S.* (1879).

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D. IX–X 13-15. A. III 11-12. Sc. 72–85 $\frac{10-13}{22-32}$; l. l. 67–78.

Depth of body $2\frac{3}{4}$ to $3\frac{1}{2}$ times in total length, length of head $2\frac{1}{2}$ to $3\frac{1}{2}$ times. Diameter of eye $\frac{2}{3}$ to $\frac{1}{2}$ length of snout, 5 to $6\frac{1}{2}$ times in length of head; interorbital width $3\frac{1}{2}$ to $4\frac{1}{2}$ times in length of head; maxillary extending to below centre or posterior third of eye (to below posterior border of eye in old specimens), the width of its distal extremity equal to the diameter of the eye in the adult, less in the young; cheeks densely covered with small scales, opercle, subopercle, and interopercle with large scales, rest of head naked. Gill-rakers rather long, stout, 6 or 7, and several rudiments, on lower part of anterior arch. Dorsal originating behind vertical of axilla; spinous and soft portions nearly equal in length and separated from each other by a rather shallow notch; first dorsal spine about half the length of the fifth or longest, which is hardly $\frac{1}{3}$ length of head and $\frac{2}{5}$ to $\frac{2}{3}$ length of longest soft rays. Pectoral $\frac{1}{2}$ to $\frac{3}{4}$ length of head. Anal spines rather weak, first and second very short, third about $\frac{2}{3}$ length of longest soft rays. Base of soft dorsal and anal fins scaly. Middle caudal rays $\frac{3}{5}$ to $\frac{2}{3}$ length of outer. Coloration very variable. Ground-colour golden, bronzy, or green with or without darker spots; two more or less distinct oblique dark streaks on each side of the head, from below the eye and from the upper border of the maxillary to the præopercular border. Young with spots or dark vertical bars.

Total length 430 millim.

Rivers of North America, from the Great Lakes to South Carolina and Arkansas.

| | | |
|---|---|---|
| *a–c.* Ad. & hgr. | Montreal. | |
| *d.* Ad. | Lake St. Clair. | A. Begg, Esq. [P.]. |
| *e, f.* Hgr. & yg., skins. | Lake Erie. | Parnell Coll. |
| *g.* Ad. | Lake Erie. | |
| *h–i.* Ad. | Toledo, Lake Erie. | |
| *k.* Hgr. | Scioto R., Ohio. | Smithsonian Instit. |
| *l.* Ad. | Charlestown, N. Hampshire. | Smithsonian Instit. |
| *m.* Ad. | Plymouth, Massachusetts. | |
| *n.* Yg. | Bean Blossom Creek, Monroe Co., Indiana. | Prof. Eigenmann. |
| *o–p.* Yg. | Cedar Bluffs, Monroe Co., Indiana. | Prof. Eigenmann. |
| *q.* Yg. | Minnesota R., Ortonsville, Minnesota. | Prof. Eigenmann. |
| *r.* Ad., skel. | Lake Erie. | |

## 2. Micropterus salmonoides.

Labrus salmoides, *Lacép. Poiss.* iv. p. 717 (1802).
Lepomis pallida, *Rafin. Ichth. Oh.* p. 30 (1820).
Cichla floridana, *Lesueur, Journ. Ac. Philad.* ii. 1822, p. 219.
Huro nigricans, *Cuv. & Val.* ii. p. 120, pl. xvii. (1828); *Dekay, N. Y. Faun., Fish.* p. 15, pl. lxix. fig. 224 (1842); *Günth.* i. p. 255 (1859).

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Perca (Huro) nigricans, *Richards. Faun. Bor.-Amer.* iii. p. 4 (1836).
Grystes salmoides, *Agass. Lake Super.* p. 296 (1850); *Holbr. Ichth. S. Carol.* p. 28, pl. iv. fig. 2 (1860).
Grystes nigricans, *Agass. l. c.* p. 297.
Grystes nobilis, *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 298.
Grystes nuecensis, *Baird & Gir. Proc. Ac. Philad.* 1854, p. 25.
Dioplites nuecensis, *Girard, Rep. U.S. Mex. Bound. Surv.* ii. *Ichth.* p. 3, pl. i. (1859).
Grystes salmonoides, part., *Günth. t. c.* p. 252.
Grystes megastoma, *Garlick, Treat. Art. Prop. Fish.* p. 108 (1857).
Micropterus nigricans, *Cope, Proc. Ac. Philad.* 1865, p. 83; *Gill, Proc. Am. Assoc.* xxii. 1873, p. 70.
Dioplites treculii, *Vaill. Miss. Sc. Mex., Poiss.* pl. iv. fig. 2 (1874).
Micropterus floridanus, *Goode, Bull. U.S. Nat. Mus.* no. 6, 1876, p. 63.
Micropterus pallidus, *Jord. Ann. Lyc. N. Y.* xi. 1877, p. 314; *Kilbourne & Goode, Game-Fishes U.S.* pl. — (1879).
Micropterus salmoides, *Jord. Proc. U.S. Nat. Mus.* ii. 1879, p. 220; *Henshall, Black Bass,* p. 110 (1881); *Jord. & Gilb. Syn. Fish. N. Am.* p. 485 (1882); *Vaill. op. cit.* p. 143 (1883); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. cxlvii. (1884), *and Amer. Fish.* p. 54, fig. (1888); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 578 (1891).
Micropterus nuecensis, *Vaill. l. c.*

D. X 12–13. A. III 10–11. Sc. 65–70 $\frac{7-8}{17-20}$; l. l. 58–67.

Depth of body nearly equal to length of head, 3 to 3½ times in total length. Diameter of eye ⅔ to ¾ length of snout, 5 to 7 times in length of head; interorbital width 3½ to 4½ times in length of head; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity at least equal to the diameter of the eye in the adult, less in the young; cheeks with 8 to 11 vertical rows of scales; opercle, subopercle, and interopercle with larger scales, rest of head naked. Gill-rakers longer than gill-fringes, 7 or 8, and several rudiments, on lower part of anterior arch. Dorsal originating just behind vertical of axilla; spinous portion longer than the soft, and separated from it by a deep notch, the penultimate spine much shorter than the last; first dorsal spine ½ to ⅔ length of fourth or fifth or longest, which is hardly ⅓ length of head and ⅔ to ¾ length of longest soft rays. Pectoral ½ length of head. Anal spines weak, third longest. Middle caudal rays about ¾ length of outer. Olive or green above, with or without small darker spots, silvery beneath; two more or less distinct oblique dark streaks on the cheek; young with a blackish lateral stripe or series of blotches.

Total length 350 millim. Grows to a much larger size.

North America east of the Rocky Mountains.

| | | |
|---|---|---|
| *a–b.* Ad. | Montreal. | |
| *c.* Ad. | Canada. | Officers of the Chatham Museum [P.]. |
| *d, e, f, g, h, i.* Hgr. & yg., skins. | Lake Erie. | Parnell Coll. |



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| | | |
|---|---|---|
| *k–l.* Ad. | Plymouth, Massachusetts. | |
| *m–n.* Yg. | St. Mary's Lake, Michigan. | Prof. Eigenmann. |
| *o.* Yg. | Minnesota R., Ortonsville, Minnesota. | Prof. Eigenmann. |
| *p.* Yg. | Cedar Bluffs, Monroe Co., Indiana. | Prof. Eigenmann. |
| *q–s.* Yg. | Gosport, Monroe Co., Indiana. | Prof. Eigenmann. |
| *t.* Yg. | Mocassin Swamp, N. Carolina. | U.S. Fish Commission. |
| *u.* Hgr. | Wekiwachee R., Florida. | Smithsonian Instit. |
| *v.* Hgr. | Tangipahoa R., Mississippi. | Smithsonian Instit. |
| *w.* Ad., skel. | Montreal. | |

## 6. APOMOTIS.

Lepomis, part., *Rafin. Journ. de Phys.* 1819, p. 420; *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 88; *Jord. & Gilb. Syn. Fish. N. Am.* p. 472 (1882).
Apomotis, part., *Rafin. l. c.*
Icthelis, part., *Rafin. Ichth. Oh.* p. 27 (1820).
Telipomis, *Rafin. l. c.*
Bryttus, part., *Cuv. & Val.* vii. p. 461 (1831); *Günth. Cat.* i. p. 258 (1859).
Mesogonistius, *Gill, Amer. Journ. Sc.* (2) xxxvii. 1864, p. 92; *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 216; *Bleek. Arch. Néerl.* xi. 1876, p. 250; *Jord. Proc. Ac. Philad.* 1877, p. 59; *Jord. & Gilb. l. c.* p. 471.
Enneacanthus, *Gill, l. c.*; *Cope, l. c.*; *Bleek. l. c.*; *Jord. l. c.*; *McKay, l. c.* p. 92; *Jord. & Gilb. l. c.* p. 469.
Hemioplites, *Cope, l. c.*; *Jord. l. c.*
Copelandia, *Jord. Bull. Buffalo Soc. N. Sc.* iii. 1877, p. 137, *and Proc. Ac. Philad.* 1877, p. 39.
Apomotis, *Jord. Proc. Ac. Philad.* 1877, p. 39.

Body short, more or less elevated, strongly compressed; scales moderate or large, feebly ciliated. Lateral line complete or interrupted, the tubes straight and occupying at least the anterior half of the exposed surface of the scale. Mouth moderate, protractile; maxillary exposed, with more or less developod supplemental bone; teeth in jaws in narrow villiform bands, those of the outer row more or less enlarged; teeth on vomers and palatines; tongue toothless; head partly naked, unarmed. Gill-membranes separate; six branchiostegals; pseudobranchiæ rudimentary; gill-rakers moderate or short. Dorsal fin single, the spinous portion longer than the soft, with VIII–XI 9–12 rays. Anal short, with III–IV 8–12 rays. Caudal rounded or emarginate. Pectorals obtusely pointed, with 11–14 rays, upper longest. Ventrals below the pectorals, close together, with a strong spine. Posterior processes of the præmaxillaries extending nearly to the frontals; frontals posteriorly with a transverse ridge, connecting the parietal and supraoccipital crests, which are very strong. Vertebræ 29 (13+16).

North America.

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*Synopsis of the Species.*

I. Caudal rounded.

Sc. 30–32 $\frac{4-5}{11}$; fourth dorsal spine longest ..... 1. *chætodon*, p. 19.

Sc. 33–35 $\frac{3-4}{10-11}$; fourth dorsal spine not longer than fifth ..... 2. *obesus*, p. 19.

II. Caudal more or less distinctly emarginate.

Sc. 33–35 $\frac{5-6}{14}$; eye a little longer than snout; ventrals reaching anus ..... 3. *symmetricus*, p. 21.

Sc. 45–55 $\frac{6-7}{15-18}$; eye not longer than snout; ventrals not reaching beyond anus ..... 4. *cyanellus*, p. 21.

Sc. 40–45 $\frac{6-7}{13-15}$; eye as long as or a little longer than snout; ventrals reaching origin of anal . 5. *punctatus*, p. 23.

## 1. Apomotis chætodon.

Pomotis chætodon, *Baird*, *9th Rep. Smiths. Instit.* p. 324 (1855); *Günth.* i. p. 263 (1859).
Bryttus chætodon, *Girard*, *Proc. Ac. Philad.* 1859. p. 158.
Mesogonistius chætodon, *Cope*, *Journ. Ac. Philad.* (2) vi. 1868, p. 218; *Jord. & Gilb. Syn. Fish. N. Am.* p. 471 (1882); *Goode*, *Fish. & Fisher. Industr. U.S.* i. pl. clxi. (1884); *Bollman*, *Rep. U.S. Fish Comm. f.* 1888, p. 565 (1891).

D. X 11–12. A. III 12. Sc. 30–32 $\frac{4-5}{11}$; l. l. 26–28.

Depth of body $1\frac{1}{2}$ to 2 times in total length, length of head 3 to $3\frac{1}{3}$ times. Snout shorter than diameter of eye, which is 3 times in length of head and equals interorbital width; maxillary reaching to below anterior border of eye; cheeks and opercles scaly; opercle with two obtuse points. Gill-rakers short, 10 or 11 on lower part of anterior arch. Dorsal originating above base of pectoral; fourth spine longest, $\frac{1}{2}$ to $\frac{2}{3}$ length of head, a little shorter than longest soft rays. Pectoral $\frac{3}{4}$ length of head. Ventrals extending to origin of anal. Third anal spine longest, nearly as long as longest dorsal. Caudal rounded. Pale olive above, silvery beneath; six or seven more or less regular vertical blackish bars, the first through the eye, the third from the three first dorsal spines to the ventrals.

Total length 80 millim.

New Jersey to Maryland.

| | | |
|---|---|---|
| *a*. Ad. | Trenton, New Jersey. | Smithsonian Instit. |
| *b*. Hgr. | Delaware River. | Prof. D. S. Jordan. |

## 2. Apomotis obesus.

Pomotis obesus, *Girard*, *Proc. Bost. Soc. N. H.* v. 1854, p. 40; *Baird*, *9th Rep. Smiths. Instit.* p. 324 (1855).
Bryttus fasciatus, *Holbr. Journ. Ac. Philad.* (2) iii. 1855, p. 51, pl. v. fig. 3; *Günth.* i. p. 260 (1859).



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Bryttus gloriosus, *Holbr. l. c.* p. 52, pl. v. fig. 4; *Günth. l. c.*
Pomotis guttatus, *Morris, Proc. Ac. Philad.* 1859, p. 3.
Hemioplites simulans, *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 217.
Enneacanthus guttatus, *Cope, l. c.* p. 219.
Enneacanthus obesus, *Jord. Man. Vert. N. U.S.* p. 232 (1876); *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 92; *Jord. & Gilb. Syn. Fish. N. Am.* p. 470 (1882); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 564 (1891).
Enneacanthus gloriosus, *Jord. Bull. Buffalo Soc. N. Sc.* iii. 1877, p. 137; *Jord. & Gilb. l. c.*; *Bollman, l. c.*
Copelandia eriarcha, *Jord. l. c. and Proc. Ac. Philad.* 1877, p. 56.
Enneacanthus pinniger, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 27.
Enneacanthus margarotis, *Jord. l. c.*
Enneacanthus simulans, *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 92; *Jord. & Gilb. l. c.*
Enneacanthus eriarchus, *McKay, l. c.* p. 93; *Bollman, l. c.*

D. VIII–X 10–12. A. III (rarely IV) 8–11. Sc. 33–35 $\frac{3\text{-}4}{10\text{-}11}$; l. l. 21–30.

Depth of body 2 to 2¼ times in total length, length of head 2⅔ to 3 times. Snout shorter than diameter of eye, which is 3 to 3¼ times in length of head and nearly equals interorbital width; maxillary reaching to below anterior third of eye; cheeks and opercles scaly; opercle with two obtuse points. Gill-rakers short, 9 or 10 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the fourth or fifth, which is ½ to ⅔ length of head; soft rays nearly as long as head in males, shorter in females. Pectoral ¾ to ⅘ length of head. Ventral extending to beyond origin of anal. Anal spines as much developed as dorsals. Caudal rounded. Lateral line continuous or interrupted. Olive; a black opercular spot; a more or less distinct dark bar below eye; body with or without more or less distinct dark vertical bars; males with golden or pale blue spots on the body and fins.

Total length 95 millim.

Eastern United States, from Massachusetts to Florida.

A. With dark vertical bars (*B. fasciatus*, Holbr.).

| | | |
|---|---|---|
| *a–d.* Ad. & yg. | Massachusetts. | |
| *e–f.* Hgr. & yg. | Dismal Swamp, Suffolk, Virginia. | U.S. Fish Commission. |
| *g.* Hgr. | N. America. | Smithsonian Instit. |

B. Without bars (*B. gloriosus*, Holbr.).

| | | |
|---|---|---|
| *a.* Hgr. | Delaware R. | Prof. D. S. Jordan. |
| *b.* Ad. | Watson's Creek, New Jersey. | Smithsonian Instit. |
| *c.* Ad. | Kinston, N. Carolina. | Smithsonian Instit. |
| *d.* Hgr. | Little River, Goldsboro', N. Carolina. | U.S. Fish Commission. |

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### 3. Apomotis symmetricus.

Lepomis symmetricus, *S. A. Forbes, in Jord. & Gilb. Syn. Fish. N. Am.* p. 473 (1882); *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 320; *Bollman, Rep. U.S. Fish. Comm. f.* 1888, p. 571 (1891); *Everm. & Kend. Bull. U.S. Fish Comm. f.* 1892, p. 111, pl. xxxii. (1894).

D. X 9–10. A. III 9. Sc. 33–35 $\frac{5-6}{14}$.

Depth of body $1\frac{2}{3}$ to $2\frac{1}{3}$ times in total length, length of head $2\frac{2}{3}$ to 3 times. Eye a little longer than snout, $3\frac{1}{4}$ to $3\frac{2}{3}$ times in length of head; lower jaw longest; maxillary reaching to below anterior third or centre of eye; opercle rounded behind. Gill-rakers long and slender. Longest spine of dorsal about $\frac{1}{2}$ length of head, $\frac{2}{3}$ length of soft rays. Pectorals and ventrals reaching anus. Caudal slightly emarginate. Dark green, sides with about 10 vertical darker bars; a large black opercular spot; dorsal fin sometimes with a dark ocellated spot on its last rays.

Total length 80 millim.

Mississippi Valley, from Illinois to New Orleans; Texas (?).

The specimen from Texas, described and figured by Evermann and Kendall, appears from the description to be a different fish. The supplemental maxillary bone is stated to be absent, the caudal fin is rounded, and the lateral line is developed on 14 scales only. However, Dr. Evermann kindly writes to me that "supplemental maxillary bone *not* present" is a slip for "present." The caudal fin, in his specimens, is usually, but not always, slightly emarginate. The dorsal ocellus is present only in the young, and is not a sexual mark.

### 4. Apomotis cyanellus.

Lepomis cyanellus, *Rafin. Journ. de Phys.* 1819, p. 420; *Jord. & Gilb. Syn. Fish. N. Am.* p. 473 (1882); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 569 (1891).

Icthelis cyanella, *Rafin. Ichth. Oh.* p. 28 (1820).

Icthelis melanops, *Rafin. l. c.*

Pomotis longulus, *Baird & Gir. Proc. Ac. Philad.* 1853, p. 391, *and in Marcy's Rep. Explor. Red R.* p. 245, pl. xii. (1853).

Pomotis pallidus (*non Mitch.*), *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 303.

Bryttus longulus, *Baird & Gir. Proc. Ac. Philad.* 1854, p. 25; *Günth.* i. p. 259 (1859).

Calliurus melanops, *Gir. Proc. Ac. Philad.* 1857, p. 200, *and Rep. U.S. Explor. R. R.* x. pt. iv. p. 11, pl. iii. (1858).

Calliurus diaphanus, *Gir. ll. cc., Rep.* p. 13, pl. iv. figs. 1–4.

Calliurus formosus, *Gir. ll. cc., Rep.* p. 14, pl. v. figs. 1–4.

Calliurus microps, *Gir. ll. cc., Rep.* p. 17, pl. iv. figs. 5–8.

Calliurus murinus, *Gir. ll. cc., Rep.* p. 18, pl. vii. figs. 1–4.

Calliurus longulus, *Gir. Rep. U.S. Mex. Bound. Surv.* ii. *Ichth.* p. 5, pl. iv. figs. 1–4 (1859).

Bryttus melanops, *Günth. t. c.* p. 260.

Bryttus murinus, *Günth. l. c.*

Bryttus mineopas, *Cope, Proc. Ac. Philad.* 1865, p. 84.

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Lepomis microps, *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 221.
Lepomis melanops, *Cope, l. c.* p. 224.
Lepomis mineopas, *Cope, l. c.*
Chænobryttus cyanellus, *Jord. Man. Vert. N. U.S.* p. 234 (1876).
Telipomis cyanellus, *Jord. Bull. Buffalo Soc. N. Sc.* iii. 1877, p. 138.
Telipomis murinus, *Jord. l. c.*
Telipomis microps, *Jord. l. c.*
Telipomis diaphanus, *Jord. l. c.*
? Lepiopomis ischyrus, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 25.
? Apomotis phenax, *Jord. l. c.* p. 26.
Apomotis cyanellus, *Jord. l. c.* p. 35.
Lepomis murinus, *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 88; *Jord. & Gilb. l. c.* p. 475.
? Lepomis phenax, *McKay, l. c.*; *Jord. & Gilb. l. c.* p. 474.
Lepomis lirus, *McKay, l. c.* p. 89; *Jord. & Gilb. l. c.* p. 483.
? Lepomis ischyrus, *Jord. & Gilb. l. c.*; *Bollman, l. c.* p. 570.
? Lepomis macrochirus, *Meek, Proc. U.S. Nat. Mus.* ix. 1891, p. 122.

D. X–XI 10–11. A. III 8–9. Sc. 45–55 $\frac{6-7}{15-18}$; l. l. 40–48.

Depth of body $2\frac{1}{6}$ to $2\frac{1}{3}$ times in total length, length of head $2\frac{2}{3}$ to 3 times. Snout as long as or a little longer than diameter of eye, which is 4 to $4\frac{1}{2}$ times in length of head and nearly equals interorbital width; maxillary reaching to below centre or posterior third of eye (to below anterior third in the young); cheeks and opercles scaly; opercle somewhat produced, rounded posteriorly. Gill-rakers moderate, 12 or 13 on lower part of anterior arch. Dorsal originating above axilla; spines increasing in length to the fourth or fifth, which is $\frac{1}{4}$ to $\frac{1}{3}$ length of head, and shorter than soft rays. Pectoral about $\frac{2}{3}$ length of head. Ventral not extending beyond anus. Third anal spine longest, nearly as long as longest dorsal. Caudal emarginate. Olive or greenish, with or without small blue spots, with or without rather indistinct dark cross-bars; a black opercular spot; cheek often with blue stripes; soft dorsal and anal frequently with a blackish spot.

Total length 160 millim.

North America east of the Rocky Mountains, from the Great Lakes to Mexico.

| | | |
|---|---|---|
| *a.* Hgr. | Goguac Lake, Michigan. | U.S. Fish Commission. |
| *b–c.* Hgr. | Lake Erie. | |
| *d.* Ad. | Cedar Bluffs, Monroe Co., Indiana. | Prof. Eigenmann. |
| *e–h.* Hgr. & yg. | Gosport, Monroe Co., Indiana. | Prof. Eigenmann. |
| *i.* Hgr. | Bean Blossom Creek, Monroe Co., Indiana. | Prof. Eigenmann. |
| *k.* Hgr. | White R., Indiana. | Prof. D. S. Jordan. |
| *l, m.* Ad. & hgr. | Cumberland R., Tennessee. | Smithsonian Instit. |
| *n.* Skel. | Bean Blossom Creek, Indiana. | Prof. Eigenmann. |

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### 5. Apomotis punctatus.

Bryttus punctatus, *Cuv. & Val.* vii. p. 462 (1831); *Günth.* i. p. 259 (1859).
Bryttus reticulatus, *Cuv. & Val. t. c.* p. 463.
Ichthelis punctatus, *Jord. Bull. Buffalo Soc. N. Sc.* iii. 1877, p. 138.
Lepomis apiatus, *Cope, Proc. Amer. Philos. Soc.* xvii. 1877, p. 66.
Lepiopomus apiatus, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 25.
Lepomis punctatus, *Jord. Proc. U.S. Nat. Mus.* ii. 1879, p. 224; *Jord. & Gibr. Syn. Fish. N. Am.* p. 476 (1882); *Goode, Fish. & Fisher. Industr. N. Am.* i. pl. clvi. (1884); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 574 (1891).

D. X 11. A. III 10–11. Sc. 40–45 $\frac{6-7}{13-15}$; l. l. 38–40.

Depth of body about twice in total length, length of head 3 times. Snout as long as or a little shorter than diameter of eye, which is $3\frac{1}{2}$ to $3\frac{2}{3}$ times in length of head and equals interorbital width; maxillary reaching to below anterior fourth or anterior third of eye; cheeks and opercles scaly; opercle rounded behind. Gill-rakers short, 8 or 9 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the fourth or fifth, which is nearly half as long as head, and shorter than soft rays. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral reaching origin of anal. Third anal spine longest, as long as longest dorsal. Caudal emarginate. Olive, with or without dark brown dots arranged in longitudinal series (one at the base of each scale); a large black opercular spot.

Total length 145 millim.

South Carolina, Georgia, Florida, Alabama.

| | | |
|---|---|---|
| *a*. Ad. | Florida. | Smithsonian Instit. |
| *b*. Ad. | Mobile, Alabama | Museum of Comp. Zoology. |

## 7. LEPOMIS.

Lepomis, part., *Rafin. Journ. de Phys.* 1819, p. 420; *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 216; *Bleek. Arch. Néerl.* x. 1876, p. 249; *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 88; *Jord. & Gilb. Syn. Fish. N. Am.* p. 472 (1882).
Pomotis, *Rafin. l. c.*
Icthelis, part., *Rafin. Ichth. Oh.* p. 27 (1820).
Bryttus, part., *Cuv. & Val.* vii. p. 461 (1831).
Pomotis, part., *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 301 *Günth. Cat.* i. p. 261 (1859).
Xenotis, *Jord. Proc. Ac. Philad.* 1877, pp. 59 & 76.
Lepiopomus, part., *Jord. Ann. Lyc. N. Y.* xi. 1877, p. 316.
Xystroplites, part., *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 24.

Body short, more or less elevated, strongly compressed; scales large, feebly ciliated. Lateral line complete, the tubes straight and occupying at least the anterior half of the exposed surface of the scale. Mouth rather small, protractile; maxillary exposed, without or with a mere rudiment of supplemental bone; teeth in jaws in

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narrow villiform bands, those of the outer row enlarged; teeth on vomer and palatines; tongue toothless; head partly naked, unarmed, opercle produced in a more or less developed dermal flap supported by horny rays. Gill-membranes separate; six branchiostegals; pseudobranchiæ more or less feebly developed; gill-rakers moderate or short. Dorsal fin single, the spinous portion longer than the soft, with X–XI 10–12 rays. Anal short, with III 8–10 rays. Caudal emarginate. Pectorals obtusely pointed, with 13 to 15 rays, upper longest. Ventrals below the pectorals, close together, with a strong spine. Posterior processes of the præmaxillaries extending to the frontals; frontals posteriorly with a transverse ridge; supraoccipital crest strong, parietal crests weak. Vertebræ 30 (14+16).

North America.

Fig. 3.—Upper view of skull of *Lepomis auritus*.

*Synopsis of the Species.*

Gill-rakers rather short, hard; sc. 43–48 $\frac{6-7}{14-16}$; longest dorsal spines about $\frac{1}{3}$ length of head.... 1. *auritus*, p. 24.

Gill-rakers very short and soft; sc. 36–45 $\frac{5-6}{14-16}$; longest dorsal spines about $\frac{1}{3}$ length of head.... 2. *megalotis*, p. 26.

Sc. 34–41 $\frac{5-6}{13-15}$; longest dorsal spines $\frac{1}{2}$ length of head ..... 3. *garmani*, p. 27.

## 1. Lepomis auritus.

Labrus auritus, *Linn. S. N.* i. p. 475 (1766).
Bryttus unicolor, *Cuv. & Val.* vii. p. 464 (1831).
Pomotis solis, *Cuv. & Val. t. c.* p. 468.
Pomotis rubricauda, *Storer, Bost. Journ. N. H.* iv. 1842, p. 177.
Pomotis appendix (*non Mitch.*), *Storer, Mem. Amer. Acad.* (2) ii. 1846, p. 294, and v. 1853, p. 62, pl. iii. fig. 4.

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? Pomotis elongatus, *Holbr. Journ. Ac. Philad.* (2) iii. 1855, p. 47, pl. v. fig. 1; *Günth.* i. p. 262 (1859).
? Bryttus albulus, *Girard, Proc. Ac. Philad.* 1857, p. 200, *and Rep. U.S. Explor. R. R.* x. pt. iv. p. 19, pl. vi. figs. 1–4 (1858); *Günth. l. c.* p. 259.
Ichthelis rubricauda, *Holbr. Ichth. S. Carol.* p. 15, pl. ii. fig. 2 (1860).
Lepomis auritus, *Gill, Amer. Journ. Sc.* (2) xxxvii. 1864, p. 93; *Jord. Proc. U.S. Nat. Mus.* ii. 1879, p. 224; *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 89; *Jord. & Gilb. l. c.* p. 477; *Goode, Fish. & Fisher. Industr. U.S.* i. pl. cliv. (1884), *and Am. Fish.* p. 66, fig. (1888); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 573 (1891).
Lepomis ophthalmicus, *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 223.
Lepomis rubricauda, *Cope, Proc. Amer. Philos. Soc.* xi. 1870, p. 452.
Ichthelis auritus, *Jord. Bull. Buffalo Soc. N. Sc.* iii. 1877, p. 138.
? Ichthelis albulus, *Jord. l. c.*
? Ichthelis elongatus, *Jord. l. c.*
Ichthelis solis, *Jord. l. c.*
Lepomis mystacalis, *Cope, Proc. Amer. Philos. Soc.* xvii. 1877, p. 66; *Jord. & Gilb. Syn. Fish. N. Am.* p. 475 (1882).
? Xystroplites gillii, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 24.
Lepiopomus miniatus, *Jord. l. c.* p. 26.
Lepiopomus auritus, *Jord. l. c.* p. 35.
? Apomotis albulus, *Jord. l. c.*
? Lepiopomus elongatus, *Jord. l. c.*
Lepiopomus mystacalis, *Jord. l. c.*
Xenotis ophthalmicus, *Jord. l. c.* p. 36.
Lepomis miniatus, *McKay, l. c.*; *Jord. & Gilb. l. c.* p. 476.
? Lepomis elongatus, *McKay, l. c.*; *Jord. & Gilb. l. c.* p. 475.
? Lepomis albulus, *McKay, l. c.*; *Jord. & Gilb. l. c.* p. 481; *Bollman, l. c.* p. 575.
? Lepomis euryorus, *McKay, l. c.*; *Jord. & Gilb. l. c.*

D. X–XI 11–12. A. III 8–10. Sc. 43–48 $\frac{6-7}{14-16}$; l. l. 40–45.

Depth of body 2 to 2½ times in total length, length of head 2¾ to 3 times. Snout as long as the eye, which is 4 to 4½ times in length of head, and nearly equal to interorbital width; maxillary extending to below anterior border or anterior third of eye; cheeks and opercles scaly; opercle terminating in a long dermal flap in the adult. Gill-rakers rather short, 8 or 9 on lower part of anterior arch. Dorsal originating above base of pectoral or axilla; spines increasing in length to the fourth, which is about ⅓ length of head and ⅔ to ¾ length of soft rays. Pectoral ⅔ to ¾ length of head. Ventral reaching anus or a little beyond. Third anal spine longest, as long as longest dorsal. Caudal emarginate. Olive above, with or without bluish spots on the sides and bluish stripes on the head; belly and lower fins red; opercular appendage black.

Total length 160 millim.

Eastern United States, from Maine to Texas.

| | | |
|---|---|---|
| *a.* Ad. | Maine. | Museum of Comp. Zoology. |
| *b–c.* Ad. | Legunfield Pond, Massachusetts. | |
| *d.* Ad. | Bucks Co., Pennsylvania. | Smithsonian Instit. |

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|---|---|---|
| *e.* Ad. | Susquehannah R., Pennsylvania. | Smithsonian Instit. |
| *f.* Yg. | James R., Petersburg, Virginia. | U.S. Fish Commission. |
| *g.* Yg. | Little R., Goldsboro', N. Carolina. | U.S. Fish Commission. |
| *h.* Yg. | Catawba R., Marion, N. Carolina. | U.S. Fish Commission. |
| *i.* Ad., skel. | N. America. | |

## 2. Lepomis megalotis.

Icthelis aurita (*non L.*), *Rafin. Ichth. Oh.* p. 29 (1820).
Icthelis megalotis, *Rafin. l. c.*
Pomotis nitidus, *Kirtland, Bost. Journ. N. H.* iii. 1842, p. 472, pl. xxviii. fig. 1.
Pomotis aquilensis, *Baird & Gir. Proc. Ac. Philad.* 1853, p. 387, *and Rep. U.S. Explor. R. R.* x. pt. iv. p. 25, pls. ix. figs. 1–4, & x. figs. 8–11 (1858), *and Rep. U.S. Mex. Bound. Surv.* ii. *Ichth.* p. 7, pl. iii. figs. 1–8 (1859).
Pomotis breviceps, *Baird & Gir. Proc. Ac. Philad.* 1853, p. 390, *and in Marcy's Explor. Red R.* p. 246, pl. xiii. (1853), *and Rep. U.S. Explor. R. R.* x. pt. iv. p. 28.
Pomotis fallax, *Baird & Gir. l. c., and Rep.* p. 27, pls. viii. figs. 9–12, ix. figs. 5–12, & x. figs. 1–7; *Gir. Rep. U.S. Mex. Bound. Surv.* ii. *Ichth.* p. 8, pl. ii. figs. 5–8, & iii. figs. 9–12 (1859).
Pomotis convexifrons, *Baird & Gir. Proc. Ac. Philad.* 1853, p. 390.
Pomotis nefastus, *Baird & Gir. l. c.*
Pomotis sanguinolentus, *Agass. Am. Journ. Sc.* (2) xvii. 1854, p. 301.
Pomotis inscriptus, *Agass. l. c.* p. 302.
Pomotis bombifrons, *Agass. l. c.* p. 303.
Pomotis marginatus, *Holbr. Journ. Ac. Philad.* (2) iii. 1855, p. 49, pl. vi. fig. 2; *Günth.* i. p. 264 (1859).
Pomoti popeii, *Baird & Gir. Rep. U.S. Explor. R. R.* x. pt. iv. p. 26.
Pomotis rubricauda (*non Storer*), *Günth. t. c.* p. 262.
Lepomis megalotis, *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 220; *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 89; *Jord. & Gilb. Syn. Fish. N. Am.* p. 477 (1882); *Bollman, Rep. U.S. Fish Comm. f.* 1888, pl. 572, pl. lxx. fig. 3 (1891).
Lepomis auritus, *Cope, l. c.*
Lepomis inscriptus, *Cope, l. c.* p. 221.
Lepomis peltastes, *Cope, Proc. Amer. Philos. Soc.* xi. 1870, p. 454.
Ichthelis auritus, *Jord. Rep. Geol. Surv. Indiana*, iv. p. 215 (1875).
Ichthelis nitidus, *Jord. l. c.*
Ichthelis bombifrons, *Jord. Man. Vert. N. U.S.* p. 237 (1876).
Ichthelis inscriptus, *Jord. l. c.*
Ichthelis fallax, *Jord. l. c.* p. 238.
Ichthelis sanguinolentus, *Jord. l. c.*
Ichthelis aquilensis, *Jord. Bull. Buffalo Soc. N. Sc.* iii. 1877, p. 138.
Ichthelis breviceps, *Jord. l. c.*
Ichthelis marginatus, *Jord. l. c.*
Xenotis solis, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 22.
Xenotis sanguinolentus, *Jord. l. c.*
Lepiopomus bombifrons, *Jord. l. c.* p. 35.
Xenotis fallax, *Jord. l. c.* p. 36.
Xenotis breviceps, *Jord. l. c.*
Xenotis popii, *Jord. l. c.*

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Xenotis megalotis, *Jord. l. c.*
Xenotis aquilensis, *Jord. l. c.*
Xenotis marginatus, *Jord. l. c.*
Xenotis peltastes, *Jord. l. c.*
Xenotis lythrochloris, *Jord. l. c.* p. 40.
Xenotis aureolus, *Jord. l. c.* p. 41.
Xenotis inscriptus, *Jord. l. c.* p. 42.
Lepomis fallax, *Hay, Proc. U.S. Nat. Mus* iii. 1880, p. 499.
Lepomis marginatus, *McKay, l. c.*; *Jord. & Gilb. l. c.* p. 478.
Lepomis bombifrons, *McKay, l. c.*; *Jord. & Gilb. l. c.*

D. X 10–12. A. III 8–10. Sc. 36–45 $\frac{5-6}{14-16}$; l. l. 31–40.

Depth of body $1\frac{3}{4}$ to $2\frac{1}{3}$ times in total length; length of head $2\frac{2}{3}$ to 3 times. Snout as long as or a little shorter than the eye, which is $3\frac{1}{2}$ to 4 times in length of head; interorbital width equal to or a little greater than diameter of eye; maxillary extending to below anterior border or anterior third of eye; cheeks and opercles scaly; opercle terminating in a long dermal flap in the adult. Gill-rakers very short and soft, almost rudimentary, 8 or 9 on lower part of anterior arch. Dorsal originating above base of pectoral or axilla; spines increasing in length to the fourth, which is about $\frac{1}{3}$ length of head and $\frac{2}{5}$ to $\frac{2}{3}$ length of soft rays. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral reaching anus or origin of anal. Third anal spine longest, as long as longest dorsal. Caudal emarginate. Olive, with orange and blue spots or wavy streaks; head with blue stripes; opercular appendage black, often edged with red or blue.

Total length 125 millim.

North America east of the Rocky Mountains, from the Great Lakes to Mexico.

| | | |
|---|---|---|
| *a*. Hgr., skin. | Lake Erie. | Parnell Coll. |
| *b*. Hgr. | Kalamazoo R., Michigan. | U.S. Fish Commission. |
| *c*. Ad. | Ohio. | Mus. Comp. Zoology. |
| *d*. Ad. | Racine, Wisconsin. | Smithsonian Instit. |
| *e,f*. Ad. & hgr. | White R., Indiana. | Prof. D. S. Jordan. |
| *g*. Ad. | Gosport, Monroe Co., Indiana. | Prof. C. Eigenmann. |
| *h*. Ad. | Bean Blossom Creek, Monroe Co., Indiana. | Prof. C. Eigenmann. |
| *i*. Ad. | Tangipahoa R., Mississippi. | Smithsonian Instit. |

### 3. Lepomis garmani.

Lepomis garmani, *S. A. Forbes, Bull. Illinois Lab.* 1885, p. 135; *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 574 (1891).

D. X 10–11. A. III 8–10. Sc. 34–41 $\frac{5-6}{13-15}$.

Apparently very closely allied to *L. megalotis*, but dorsal spines longer, the longest about half length of head. Colour dark, with a purplish tint; sides striped with rows of bronze blotches, one to each scale.

Total length 100 millim.

Wabash and Illinois Valleys.

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## 8. EUPOMOTIS.

Lepomis, part., *Rafin. Journ. de Phys.* 1819, p. 420; *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 216; *Bleek. Arch. Néerl.* xi. 1876, p. 249; *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 88; *Jord. & Gilb. Syn. Fish. N. Am.* p. 472 (1882).
Apomotis, part., *Rafin. l. c.*
Icthelis, part., *Rafin. Ichth. Oh.* p. 27 (1820).
Pomotis (*non Rafin.*), *Cuv. & Val.* iii. p. 90 (1829); *Cope, l. c.*; *Jord. Proc. Ac. Philad.* 1877, p. 58.
Pomotis, part., *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 301; *Günth. Cat.* i. p. 261 (1859).
Eupomotis, *Gill & Jord. Field and Forest*, 1877, ii. p. 190; *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 20.
Lepiopomus, part., *Jord. Ann. Lyc. N. Y.* xi. 1877, p. 316.
Helioperca, *Jord. l c.* p. 355.
Lepomis, *Jord. Proc. Ac. Philad.* 1877, p. 59.
Xystroplites, part., *Jord. l. c.* p. 24.

Body short, more or less elevated, strongly compressed; scales large, feebly ciliated. Lateral line complete, the tubes straight and occupying at least the anterior half of the exposed surface of the scale. Mouth rather small, protractile; maxillary exposed, supplemental bone minute or absent; teeth in jaws in narrow villiform bands, those of the outer row enlarged; teeth on vomer; palatines toothless or with a few teeth; tongue toothless; head partly naked, unarmed, præopercle feebly denticulate; opercle produced in a more or less developed dermal flap. Gill-membranes separate; six branchiostegals; pseudobranchiæ more or less feebly developed; gill-rakers moderate or short. Dorsal fin single, the spinous portion longer than the soft, with X–XI 10–12 rays. Anal short, with III 8–12 rays. Caudal emarginate. Pectorals acutely pointed, subfalciform, upper rays very long; rays 11–14. Ventrals behind base of pectorals, close together, with a strong spine. Posterior processes of the præmaxillaries extending to the frontals; frontals posteriorly with a transverse ridge, connecting the parietal and supraoccipital crests; latter very strong. Vertebræ 29–30 (13+16–17).

North America.

### *Synopsis of the Species.*

I. Gill-rakers moderate or rather long on lower part of anterior arch.

A. Pharyngeal teeth conical.

Sc. 43–52 $\frac{7\text{–}8}{15\text{–}18}$ ..... ..... 1. *pallidus*, p. 29.

Sc. 40–43 $\frac{6}{15}$ ..... 2. *macrochirus*, p. 30.

Sc. 33–39 $\frac{5\text{–}6}{11\text{–}13}$ ..... 3. *humilis*, p. 30.

B. Pharyngeal teeth subspherical; sc. 44–45 $\frac{6\text{–}7}{15\text{–}16}$.
4. *holbrookii*, p. 31.

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II. Gill-rakers very short and soft; pharyngeal teeth subspherical or bluntly conical.

Sc. 34–40 $\frac{4\text{–}5}{13\text{–}15}$ ..... 5. *heros*, p. 32.

Sc. 40–47 $\frac{6}{13\text{–}15}$ ..... 6. *aureus*, p. 32.

## 1. Eupomotis pallidus.

Labrus pallidus, *Mitchill, Tr. Lit. & Phil. Soc. N. Y.* 1815, p. 407.
Lepomis appendix, *Mitchill, Amer. Monthl. Mag.* 1818, p. 247.
Pomotis incisor, *Cuv. & Val.* vii. p. 466 (1831).
Pomotis gibbosus, *Cuv. & Val. t. c.* p. 467.
Pomotis macrochira, *Kirtl. Bost. Journ. N. H.* iii. 1841, p. 469, pl. xxvii. fig. 3.
Pomotis speciosus, *Baird & Gir. Proc. Ac. Philad.* 1854, p. 24, *and Rep. U.S. Explor. R. R.* x. pt. iv. p. 23, pl. viii. figs. 5–8 (1858); *Gir. Rep. U.S. Mex. Bound. Surv.* ii., *Ichth.* p. 5, pl. iv. figs. 5–8 (1859); *Günth.* i. p. 263 (1859).
Pomotis obscurus, *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 302.
Pomotis pallidus, *Agass. l. c.* p. 303.
Lepomis luna, *Gir. Proc. Ac. Philad.* 1857, p. 201; *Baird & Gir. l. c.* p. 22, pl. viii. figs. 1–4.
Ichthelis incisor, *Holbr. Ichth. S. Carol.* p. 12, pl. ii. fig. 1 (1860).
Lepomis incisor, *Gill, Amer. Journ. Sc.* (2) xxxvii. 1864, p. 93; *Cope, Proc. Ac. Philad.* 1865, p. 83.
Lepomis longispinis, *Cope, l. c., and Journ. Ac. Philad.* (2) vi. 1868, p. 220.
Lepomis ardesiacus, *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 224.
Ichthelis speciosus, *Jord. Bull. Buffalo Soc. N. Sc.* iii. 1877, p. 138.
Ichthelis obscurus, *Jord. l. c.*
Lepiopomus pallidus, *Jord. Ann. Lyc. N. Y.* xi. 1877, p. 316.
Lepiopomus obscurus, *Jord. t. c.* p. 317.
Helioperca pallida, *Jord. t. c.* p. 355.
Eupomotis pallidus, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 21.
Lepomis pallidus, *Jord. Man. Vert. N. U.S.* 2nd ed. p. 241 (1878); *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 89; *Jord. & Gilb. Syn. Fish. N. Am.* p. 479 (1882); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. clv. (1884); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 574 (1891).
Lepomis obscurus, *Jord. l. c.* p. 242.
Lepomis heros, *Bean, Cat. Fish. U.S. Int. Fisher. Exhib.* 1883, p. 77.

D. X 11–12. A. III 11–12. Sc. 43–52 $\frac{7\text{–}8}{15\text{–}18}$; l.l. 40–50.

Depth of body $1\frac{4}{5}$ to $2\frac{1}{4}$ times in total length, length of head $2\frac{3}{4}$ to $3\frac{1}{5}$ times. Snout as long as diameter of eye, which is $3\frac{1}{2}$ to 4 times in length of head; interorbital width 3 to $3\frac{1}{2}$ times in length of head; maxillary extending to below anterior border of eye; præopercular border more or less distinctly denticulate in the adult; cheeks and opercles scaly; opercle produced in a more or less developed dermal flap. Gill-rakers rather long, 11 to 13 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the fourth or fifth, which is about $\frac{1}{2}$ length of head and at least $\frac{3}{4}$ length of longest soft rays. Pectoral as long as or a little longer than the head. Ventral

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reaching origin of anal. Third anal spine longest, as long as or a little longer than longest dorsal, a little shorter than longest soft rays. Caudal emarginate. Olive-green above; belly in old specimens often coppery-red; opercular appendage black; nearly always a blackish spot on posterior dorsal rays; young with numerous more or less distinct dark vertical bars.

Total length 210 millim.

North America east of the Rocky Mountains, from the Great Lakes to Florida and Mexico.

| | | |
|---|---|---|
| *a, b, c.* Hgr. & yg., skins. | Lake Erie? | Parnell Coll. |
| *d–g.* Yg. | Lake Erie. | |
| *h.* Ad. | Pine Lake, Ingham Co., Michigan. | Smithsonian Instit. |
| *i.* Ad. | Sandusky, Ohio. | Smithsonian Instit. |
| *k.* Hgr. | Wabash R., Mackey's Ferry, Indiana. | U.S. Fish Commission. |
| *l–p.* Yg. | Gosport, Indiana. | Prof. Eigenmann. |
| *q–r.* Ad. & hgr. | Arkansas. | Mus. Compar. Zoology. |
| *s.* Ad. | McBean, Georgia. | Smithsonian Instit. |
| *t.* Ad. | St. John's R., Florida. | Smithsonian Instit. |
| *u.* Skel. | N. America. | Dr. Günther [P.]. |

### 2. Eupomotis macrochirus.

Lepomis macrochirus, *Rafin. Journ. de Phys.* 1819, p. 572; *Jord. & Gilb. Syn. Fish. N. Am.* p. 475 (1882); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 572 (1891).
Icthelis macrochira, *Rafin. Ichth. Oh.* p. 27 (1820).
Lepomis nephelus, *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 222.
Lepiopomus macrochirus, *Jord. Ann. Lyc. N. Y.* ii. 1877, p. 376.

D. X 12. A. III 10. Sc. 40–43 $\frac{6}{15}$.

Depth of body $2\frac{1}{3}$ times in total length, length of head 3 times. Snout a little shorter than diameter of eye, which is $3\frac{3}{4}$ to 4 times in length of head and $\frac{2}{3}$ interorbital width; maxillary extending to below anterior third of eye; opercular flap moderate. Gill-rakers moderate, 11 on lower part of anterior arch. Longest spine of dorsal about $\frac{1}{2}$ length of head. Pectoral as long as head. Ventral reaching anal. Caudal emarginate. Olive or steel-blue, adult with round orange spots on the sides; opercular flap black, edged with red.

Total length 130 millim.

Ohio Valley; Western Pennsylvania to Kentucky and Illinois.

### 3. Eupomotis humilis.

Bryttus humilis, *Gir. Proc. Ac. Philad.* 1857, p. 201; *Baird & Gir. Rep. U.S. Explor. R. R.* x. pt. iv. p. 21, pl. vii. figs. 9–24 (1858).
Bryttus oculatus, *Cope, Proc. Ac. Philad.* 1865, p. 83.
Lepomis oculatus, *Cope, Journ. Ac. Philad.* (2) vi. 1868, p. 221.
Lepomis anagallinus, *Cope, l. c.*

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Lepomis humilis, *Cope, l. c.* p. 223; *Jord. & Gilb. Syn. Fish. N. Am.* p. 479 (1882); *Jord. & Meek, Proc. U.S. Nat. Mus.* viii. 1885, p. 12; *Bollman, Rept. U.S. Fish Comm. f.* 1888, p. 571 (1891).
Ichthelis anagallinus, *Jord. Bull. Buffalo Soc. N. Sc.* iii. 1877, p. 138.
Ichthelis humilis, *Jord. l. c.*
Ichthelis oculatus, *Jord. l. c.*
Lepiopomus humilis, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 35.
Lepiopomus anagallinus, *Jord. l. c.*
Lepiopomus oculatus, *Jord. l. c.*

D. X–XI 10–11. A. III 8–9. Sc. 33–39 $\frac{5-6}{11-13}$; l. l. 25–32.

Depth of body $2\frac{1}{4}$ to $2\frac{1}{2}$ times in total length, length of head $2\frac{3}{4}$ to 3 times. Snout as long as or a little shorter than diameter of eye, which is 3 to $3\frac{1}{2}$ times in length of head and nearly equals interorbital width; maxillary extending to below anterior border or anterior third of eye; cheeks and opercles scaly; opercular dermal appendage short. Gill-rakers rather long, 11 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the fourth or fifth, which is not quite $\frac{1}{2}$ length of head, and a little shorter than longest soft rays. Pectoral a little shorter than the head. Ventral nearly reaching origin of anal. Third anal spine longest, as long as longest dorsal, about $\frac{2}{3}$ length of longest soft rays. Caudal emarginate. Bluish in life, with greenish spots and mottlings; sides with round red spots; usually a blackish spot on last dorsal rays; a black opercular spot; belly and lower fins red.

Total length 55 millim. Grows to 100.

Mississippi Valley, Kansas, Texas.

*a.* Hgr. New Orleans.

### 4. Eupomotis holbrookii.

Pomotis holbrookii, *Cuv. & Val.* vii. p. 466 (1831).
Pomotis speciosus, *Holbr. Journ. Ac. Philad.* (2) iii. 1855, p. 48, pl. v. fig. 2.
Pomotis microlophus, *Günth.* i. p. 264 (1859).
Ichthelis microlophus, *Jord. Bull. Buffalo Soc. N. Sc.* iii. 1877, p. 138.
Xystroplites longimanus, *Cope, Proc. Amer. Philos. Soc.* xvii. 1877, p. 67.
Eupomotis speciosus, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 21.
Eupomotis holbrookii, *Jord. Proc. U.S. Nat. Mus.* ii. 1879, p. 224.
Lepomis holbrookii, *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 92; *Jord. & Gilb. Syn. Fish. N. Am.* p. 482 (1882); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 576 (1891).

D. X 10–12. A. III 9–11. Sc. 44–45 $\frac{6-7}{15-16}$; l. l. 43.

Depth of body about twice in total length, length of head 3 times. Snout as long as the eye, which is 4 times in length of head; interorbital width 3 times in length of head; maxillary extending to

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below anterior border of eye; præopercular border denticulate; cheeks and opercles scaly; dermal opercular flap very small or absent. Gill-rakers moderate, 10 on lower part of anterior arch. Pharyngeal teeth with rounded, subspherical crowns. Dorsal originating above base of pectoral; spines increasing in length to the fourth, which is about ½ length of head and as long as the longest short rays or a little shorter. Pectoral as long as head. Ventral nearly reaching origin of anal. Third anal spine longest, as long as longest dorsal, nearly as long as soft rays. Caudal emarginate. Olive above, silvery beneath; a black opercular spot.

Total length 165 millim.

Eastern United States, from Virginia to Florida.

| | | | |
|---|---|---|---|
| *a*. Ad. | | Florida. | Smithsonian Instit. |

### 5. Eupomotis heros.

Pomotis heros, *Baird & Gir. Proc. Ac. Philad.* 1854, p. 25; *Gir. Rep. U.S. Mex. Bound. Surv.* iii., *Ichth.* p. 6, pl. ii. figs. 1–4 (1859); *Günth.* i. p. 263 (1859).
Pomotis notatus, *Agass. Amer. Journ. Sc.* (2) xvii. 1854, p. 302.
Xystroplites heros, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 24.
Xystroplites notatus, *Jord. l. c.*
Lepomis heros, *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 89; *Jord. & Gilb. Syn. Fish. N. Am.* p. 480 (1882); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 575 (1891).
Lepomis notatus, *McKay, l. c.*; *Jord. & Gilb. l. c.* p. 482.

D. X 11–12. A. III 11–12. Sc. 34–40 $\frac{4-5}{13-15}$.

Depth of body 2 to 2⅔ times in total length, length of head 2½ to 3 times. Snout as long as diameter of eye, which is 3½ to 4 times in length of head; maxillary extending to below anterior border of eye; opercular flap small. Gill-rakers very short. Pharyngeal teeth bluntly conical. Dorsal spines increasing in length to the fifth, which is about ½ length of head, and nearly as long as longest soft rays. Pectoral as long as, or a little longer than, the head. Third anal spine longest, as long as longest dorsal. Caudal emarginate. Dusky olive, silvery beneath; usually a faint dark spot on last dorsal rays; a black opercular spot.

Total length 170 millim.

Southern Indiana to Florida and Texas.

### 6. Eupomotis aureus.

*Catesby, N. H. Carol.* ii. pl. viii. fig. 3 (1731).
Perca gibbosa, *Linn. S. N.* (ed. 10) i. p. 293 (1758).
Sparus aureus, *Walb. Art. Gen. Pisc.* iii. p. 290 (1792).
Morone maculata, *Mitchill, Rep. Fish. New York*, p. 19 (1814).
Pomotis vulgaris, *Cuv. & Val.* iii. p. 91, pl. xlix. (1829); *Richards. Faun. Bor.-Am.* iii. p. 24, pl. lxxvi. (1836); *Kirtl. Bost. Journ. N. H.* iii. 1841, p. 470, pl. xxviii. fig. 2; *DeKay, N. York*

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*Faun., Fish.* p. 51, pl. li. fig. 166 (1842); *Storer, Mem. Amer. Acad.* (2) v. 1853, p. 60, pl. iii. fig. 1; *Holbr. Ichth. S. Carol.* p. 8, pl. i. fig. 2 (1860).

Pomotis ravenelii, *Cuv. & Val.* vii. p. 465 (1831).

Pomotis catesbei, *Cuv. & Val. t. c.* p. 469.

Pomotis auritus, *Günth.* i. p. 261 (1859).

Pomotis maculatus, *Cope, Proc. Ac. Philad.* 1865, p. 83.

Eupomotis aureus, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 21, *and Proc. U.S. Nat. Mus.* ii. 1879, p. 225.

Lepomis gibbosus, *McKay, Proc. U.S. Nat. Mus.* iv. 1881, p. 91; *Jord. & Gilb. Syn. Fish. N. Am.* p. 482 (1882); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. cliii. (1884), *and Amer. Fish.* p. 64, fig. (1888); *Bollman, Rep. U.S. Fish Comm. f.* 1888, p. 576 (1891).

D. X 10–12. A. III 10–11. Sc. 40–47 $\frac{6}{13-16}$; l. l. 35–45.

Depth of body $1\frac{3}{4}$ to 2 times in total length, length of head 3 times. Snout as long as diameter of eye, which is 4 to $4\frac{1}{2}$ times in length of head; interorbital width 3 times in length of head; maxillary extending to below anterior border of eye; præopercular border more or less distinctly denticulate in the adult; cheeks and opercles scaly; opercle produced in a small dermal flap. Gill-rakers very short, soft, almost rudimentary, 8 to 10 on lower part of anterior arch. Pharyngeal teeth with rounded, subspherical crowns. Dorsal originating above base of pectoral; spines increasing in length to the third, fourth, or fifth, which is $\frac{2}{5}$ to $\frac{1}{2}$ length of head and $\frac{2}{3}$ to $\frac{4}{5}$ length of longest soft rays. Pectoral as long as the head or a little shorter. Ventral reaching anus or origin of anal. Third anal spine longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, $\frac{3}{5}$ to $\frac{2}{3}$ length of longest soft rays. Caudal emarginate. Greenish-olive above, shaded with bluish, sides spotted or blotched with orange; cheeks orange, with blue wavy streaks; belly orange; opercular flap black, edged with scarlet.

Total length 180 millim.

North America east of the Mississippi.

| | | |
|---|---|---|
| *a–c.* Ad. | Montreal. | |
| *d.* Ad. | Canada. | Officers of the Chatham Mus. [P.]. |
| *e, f, g, h.* Ad. & hgr., skins. | Lake Erie. | Parnell Coll. |
| *i.* Ad. | Bay View, Michigan. | Prof. Eigenmann. |
| *k.* Hgr. | Goguac L., Michigan. | U.S. Fish Commission. |
| *l.* Yg. | Rawson L., Michigan. | U.S. Fish Commission. |
| *m.* Ad. | Root R., Wisconsin. | Smithsonian Instit. |
| *n.* Ad. | New York. | |
| *o.* Ad. | Potomac R. | Smithsonian Instit. |
| *p.* Yg. | Neuse R., Raleigh, N. Carolina. | U.S. Fish Commission. |
| *q.* Ad. | Georgia. | Mus. Compar. Zoology. |
| *r.* Ad., skin. | New Orleans (?). | Parnell Coll. |
| *s–t, u.* Ad. | N. America. | |
| *v.* Ad., skel. | N. America. | Zoological Society. |
| *w.* Hgr., skel. | Georgia. | Mus. Compar. Zoology. |



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## 9. ELASSOMA.

Elassoma, *Jordan, Bull. U.S. Nat. Mus.* no. 10, 1877, p. 50; *Jord. & Gilb. Syn. Fish. N. Am.* pp. 461 & 915 (1882).

Body oblong, compressed; scales large, cycloid. No lateral line. Mouth rather small, protractile; maxillary exposed distally, without supplemental bone; teeth in jaws in narrow bands, the outer row enlarged; a few teeth on the vomer; tongue smooth; head partly naked, unarmed. Gill-membranes broadly united; five branchiostegals; gill-rakers short; pseudobranchiæ rudimentary. Dorsal fin single, small, with IV–V 9–11 rays. Anal short, with III 5–6 rays. Caudal rounded. Pectorals subsymmetrical, rounded, with 16 rays. Ventrals behind base of pectorals, close together, with a weak spine. Posterior processes of præmaxillaries extending to the frontals; latter smooth; parietal and supra-occipital crests not produced on the frontals. Vertebræ 25 (10 + 15).

North America.

This genus appears to represent a dwarfed form of the *Centrarchidæ*, with which it agrees in essential respects. So far as I can judge from a specimen of *E. evergladii*, the structure of the vertebral column is of the same type.

### 1. Elassoma zonatum.

Elassoma zonata, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 50, *and Man. Vert. N. U.S.* 2nd ed. p. 248 (1878); *Hay, Proc. U.S. Nat. Mus.* iii. 1880, p. 500; *Jord. & Gilb. Syn. Fish. N. Am.* pp. 461 & 915 (1882); *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 320.

D. IV–V 9–11. A. III 5–6. Sc. 36–42.

Depth of body 3 to 3½ times in total length, length of head 3 times. Snout shorter than diameter of eye, which is about 3 times in length of head and equals interorbital width; maxillary extending to below anterior third of eye; cheeks and opercles scaly; opercle ending in a short dermal flap. Dorsal spines increasing in length to the last, which is about ⅔ length of head. Pectoral shorter than head. Ventral reaching anal. Caudal rounded. 18 or 19 scales in a transverse series. Olive, dotted with darker and with more or less distinct dark vertical bars; a black spot on each side, below the origin of the dorsal.

Total length 31 millim.

From South Illinois to Texas and Alabama.

| | | | |
|---|---|---|---|
| *a*. Ad. | | New Orleans. | Smithsonian Institution. |

### 2. Elassoma evergladii.

Elassoma evergladii, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 323 *Woolman, Bull. U.S. Fish Comm.* x. 1892, p. 299, pl. liii. fig. 4.

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Very closely allied to the preceding, but scales fewer, viz. 27–30 in a longitudinal and 13–16 in a transverse series. Dusky olive, with or without darker spots; dorsal, anal, and caudal fins with dark bars; ventrals dusky or blackish.

Total length 30 millim.

Florida.

*a–b*. Ad. Katleen, Florida. A. J. Woolman, Esq. [C.].

## 10. KUHLIA.

Dules, part., *Cuv. & Val.* iii. p. 111 (1829); *Günth. Cat.* i. p. 266 (1859).

Kuhlia, *Gill, Proc. Ac. Philad.* 1861, p. 48; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 418.

Moronopsis, *Gill, Proc. Ac. Philad.* 1863, p. 82; *Bleek. Arch. Néerl.* vii. 1872, p. 373, *and Atl. Ichth.* vii. p. 119 (1876).

Paradules, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 257 (name only).

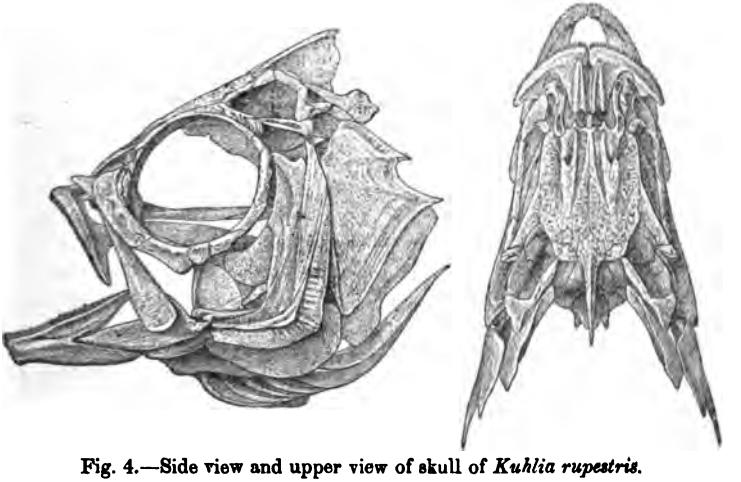

Fig. 4.—Side view and upper view of skull of *Kuhlia rupestris*.

Body oblong, strongly compressed; scales large, ciliated. Lateral line complete, the tubes straight and occupying the anterior half of the exposed surface of the scale. Mouth large, protractile; maxillary exposed, without supplemental bone; teeth in jaws in villiform bands; teeth on vomer, palatines, entopterygoids, and ectopterygoids; tongue smooth; head partly naked; præorbital and præopercle denticulate; opercle with two spines. Gill-membranes separate; six branchiostegals; pseudobranchiæ large; gill-rakers long and slender. Dorsal fins connected at the base, with X 9–13 rays, the spinous portion longer than the soft. Anal as much developed as the soft dorsal, with III 10–12 rays. Dorsal and anal fins fitting in a well-developed sheath. Caudal emarginate. Pectorals obtusely pointed, with 14 or 15 rays, upper longest. Ventrals behind base



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of pectorals, close together, with a strong spine. Posterior processes of the præmaxillaries not extending to the frontals; supraoccipital bone extending forwards to between the postfrontal processes, its crest not extending on the upper surface of the cranium; parietals short, without crest. Vertebræ 25 (10–11 + 14–15).

Fresh and brackish waters of East Africa, the Islands of the Indian and Pacific Oceans, and North Australia.

*Synopis of the Species.*

I. Tenth dorsal spine much longer than ninth; 10 or 11 soft rays in the dorsal and in the anal.

A. Caudal feebly or moderately emarginate, the lobes rounded or obtusely pointed; fifth dorsal spine ⅓ to ½ length of head, a little shorter than longest soft rays; 40 to 45 scales in the lateral line; 17 or 18 gill-rakers on lower part of anterior arch.

1. *rupestris*, p. 36.

B. Caudal bifid, the lobes acutely pointed; fifth dorsal spine at least ½ length of head, at least as long as longest soft rays.

1. 40 to 46 scales in the lateral line; 16 to 18 gill-rakers on lower part of anterior arch.

Maxillary reaching at least to below centre of eye. 2. *urvillii*, p. 38.
Maxillary not quite reaching to below centre of eye ..... 3. *marginata*, p. 38.

2. 50 to 56 scales in the lateral line; 24 to 28 gill-rakers on lower part of anterior arch.

Anal not or but slightly longer than its distance from the caudal ..... 4. *tæniura*, p. 39.
Anal considerably longer than its distance from the caudal ..... 5. *malo*, p. 40.

II. Tenth dorsal spine not or but slightly longer than ninth; 11 to 13 soft rays in the dorsal, 12 or 13 in the anal; 52 to 55 scales in the lateral line; 25 to 28 gill-rakers on lower part of anterior arch.

6. *caudovittata*, p. 41.

## 1. Kuhlia rupestris.

Centropomus rupestris, *Lacép. Poiss.* iv. pp. 252 & 273 (1802).
Perca ciliata, *Cuv. & Val.* ii. p. 52 (1828).
Dules fuscus, *Cuv. & Val.* iii. p. 118 (1829); *Peters, Mon. Berl. Ac.* 1855, p. 432; *Günth.* i. p. 268 (1859); *Peters, Reise n. Mossamb.* iv. p. 10 (1868); *Sauv. Hist. Madag., Poiss.* p. 149, pl. xv. fig. 4 (1891).
Dules rupestris, *Cuv. & Val. t. c.* p. 119, and vii. p. 477 (1831); *Bleek. Nat. Tijdschr. Nederl. Ind.* vi. 1854, p. 209; *Günth. t. c.* p. 268; *Sauv. l. c.* p. 150, pl. xli. B. fig. 3.
Dules guamensis, *Cuv. & Val.* vii. p. 474; *Hombr. & Jacquin. in Dumont d'Urv. Voy. Pôle Sud, Poiss.* pl. iii. fig. 1 (1846); *Günth. t. c.* p. 269; *Macleay, Proc. Linn. Soc. N. S. W.* viii. 1883, p. 257.
Dules vanicolensis, *Cuv. & Val. t. c.* p. 478; *Hombr. & Jacquin. l. c.* fig. 2.
Percichthys ciliata, *Günth. t. c.* p. 62.
Kuhlia ciliata, *Gill, Proc. Ac. Philad.* 1861, p. 48.
Paradules rupestris, *Bleek. Nederl. Tijdschr. Dierk.* ii. 1865, p. 276.

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Moronopsis rupestris, *Bleek. Arch. Néerl.* vii. 1872, p. 379, *and Atl. Ichth.* vii. p. 121, pl. cccxlix. fig. 2 (1876).
Dules marginatus, *Day, Fish. Ind.* p. 67, pl. xviii. fig. 1 (1875), *and Faun. Ind., Fish.* i. p. 503, fig. (1889).
Dules haswellii, *Macleay, Proc. Linn. Soc. N.S.W.* v. 1880, p. 359.
Moronopsis fuscus, *Steind. Sitzb. Ak. Wien*, lxxxii. i. 1881, p. 240.

D. X 11. A. III 10. Sc. 40–45 $\frac{5\text{-}6}{10\text{-}11}$.

Depth of body $2\frac{1}{2}$ to 3 times in total length, length of head $2\frac{3}{4}$ to to $3\frac{1}{4}$ times. Snout as long as or a little shorter than the diameter of the eye, which is $3\frac{1}{4}$ to 5 times in length of head; interorbital width 3 to $3\frac{1}{2}$ times in length of head; lower jaw projecting; maxillary extending to below centre or posterior third of eye, the width of its distal extremity $\frac{1}{3}$ to $\frac{2}{3}$ diameter of eye; top of head rugose; cheeks and opercles with large ciliated scales; lower border of præopercle finely denticulate, entire in old specimens; lower opercular spine strong. Gill-rakers 17 or 18 on lower part of anterior arch. Dorsal originating above or just behind vertical of axilla; fifth, or fourth and fifth spines longest, $\frac{1}{3}$ to $\frac{2}{3}$ length of head, shorter than anterior soft rays; last spine much longer than penultimate, as long as third. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Ventral as long as pectoral, reaching anus or not quite so far. Anal longer than its distance from the caudal; third spine a little longer than second, $\frac{1}{2}$ to $\frac{2}{3}$ length of longest soft rays. Caudal emarginate, the lobes rounded or obtusely pointed; middle rays $\frac{2}{3}$ to $\frac{3}{4}$ length of outer. Bluish or olive above, silvery beneath, some or all of the scales with a blackish basal spot; round blackish spots usually present at the base of the anal fin; part of the soft dorsal blackish; caudal blackish at the end, each lobe with a more or less distinct light edge.

Total length 400 millim.

East Africa, Madagascar, Mascarene Islands, Malay Archipelago, Caroline Islands, New Guinea, and Islands of the South Pacific.

| | | |
|---|---|---|
| *a–c.* Ad. & hgr. | Zanzibar. | Sir Lambert Playfair [P.]. |
| *d.* Hgr. | Mauritius. | Zoological Society. |
| *e–k.* Ad., hgr., & yg. | Rodriguez. | G. Gulliver, Esq. [P.]. |
| *l.* Ad. | Pelew Ids. | Museum Godeffroy. |
| *m.* Ad. | Ponapé, Caroline Ids. | Museum Godeffroy. |
| *n.* Yg. | Amboyna. | |
| *o–p, q–r.* Ad., hgr., & yg. | Treasury Id., Solomons. | H. B. Guppy, Esq. [P.]. |
| *s.* Hgr. | Shortland Ids., Solomons. | H. B. Guppy, Esq. [P.]. |
| *t.* Ad. | Stirling Id., Solomons. | H. B. Guppy, Esq. [P.]. |
| *u.* Hgr. | Malicola Id., New Hebrides. | D. McNabb, Esq. [P.]. |
| *v.* Yg. | Futuna Id., New Hebrides. | Museum Godeffroy. |
| *w.* Ad. | Fiji Ids. | H.M.S. 'Herald.' |
| *x–z.* Hgr. & yg. | Ovalau, Fiji Ids. | H.M.S. 'Herald.' |
| *α.* Ad. | Tonga Ids. | Museum Godeffroy. |
| *β.* Ad., skel. | Rodriguez. | G. Gulliver, Esq. [P.]. |
| *γ.* Ad., skel. | Fiji Ids. | H.M.S. 'Herald.' |

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### 2. Kuhlia urvillii.

Dules marginatus (*non C. & V.*), *Hombr. & Jacquin. in Dumont d'Urv. Voy. Pôle Sud, Poiss.* pl. iii. fig. 3 (1846)*.

D. X 10. A. III 10. Sc. 44 $\frac{5}{10}$.

Depth of body $2\frac{4}{5}$ times in total length, length of head $3\frac{1}{3}$ times. Snout a little shorter than diameter of eye, which is $3\frac{1}{2}$ times in length of head; maxillary extending slightly beyond vertical of centre of eye. Last dorsal spine longest, $\frac{2}{3}$ length of head, as long as soft rays, and twice as long as penultimate spine; fourth and fifth spines equal, about $\frac{1}{2}$ length of head. Anal longer than its distance from the caudal; third spine slightly longer than second, $\frac{3}{5}$ length of anterior soft rays. Caudal forked, middle rays about half length of outer. Silvery, bluish grey on the back; upper half of soft dorsal black; anterior angle of soft portion of anal black; caudal edged with blackish, the lobes blackish.

Total length 160 millim.

*Hab.* ——? Probably some South Pacific Island.

### 3. Kuhlia marginata.

Dules marginatus, *Cuv. & Val.* iii. p. 116, pl. lii.† (1829), and vii. p. 474 (1831); *Bleek. Nat. Tijdschr. Nederl. Ind.* iii. 1852, p. 573; *Günth.* i. p. 268 (1859).

Dules maculatus, *Cuv. & Val.* vii. p. 475; *Bleek. Nat. Tijdschr. Nederl. Ind.* v. 1853, p. 333.

Dules malo (*non C. & V.*), *Hombr. & Jacq. in Dumont d'Urv. Voy. Pôle Sud, Poiss.* pl. iii. fig. 4 (1846).

Paradules marginatus, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 257.

Moronopsis ciliatus, *Bleek. Arch. Néerl.* vii, 1872, p. 376, *and Atl. Ichth.* vii. p. 120, pl. cccxvi. fig. 1, and cccxxiv. fig. 2 (1876).

Dules marginatus, part., *Günth. Fische d. Südsee*, p. 24 (1873).

Dules ciliatus, *Macleay, Proc. Linn. Soc. N.S.W.* vii. 1882, p. 237.

Dules papuensis, *Macleay, Proc. Linn. Soc. N. S. W.* viii. 1883, p. 257.

D. X 10–12. A. III 11–12. Sc. 40–46 $\frac{4-5}{9-11}$.

Depth of body $2\frac{2}{3}$ to $3\frac{1}{5}$ times in total length, length of head 3 to $3\frac{1}{2}$ times. Snout $\frac{1}{2}$ to $\frac{2}{3}$ as long as eye, the diameter of which is $2\frac{2}{3}$ to 3 times in length of head and nearly equals or a little exceeds interorbital width; lower jaw slightly projecting; maxillary extending to below anterior third or hardly to centre of eye, the width of its distal extremity $\frac{1}{4}$ to $\frac{1}{3}$ diameter of eye; cheeks and opercles with large ciliated scales; angle and lower border of præopercle finely denticulate; lower opercular spine strong. Gill-rakers 16 to 18 on lower part of anterior arch. Dorsal originating behind vertical of axilla; fifth or fifth and sixth spines longest, $\frac{1}{2}$ to $\frac{2}{3}$ length of head, as long as or a little longer than anterior soft rays;

* The specimen is not in the Paris Museum.

† Type (Paris Mus. no. 3006) examined.

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last spine much longer than penultimate, nearly as long as fourth or fifth, and a little shorter than anterior soft rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral as long as pectoral or a little longer, reaching anus or origin of anal. Anal longer than its distance from the caudal; third spine a little longer than second, about as long as third dorsal, at least $\frac{3}{4}$ length of anterior soft rays. Caudal forked, middle rays about $\frac{1}{2}$ length of outer. Silvery; back greyish, with or without small darker spots; soft dorsal and anal fins dark-edged, at least anteriorly; caudal with a blackish posterior border, and with a fine whitish upper and lower edge, often with an ill-defined angular dark band in the middle.

Total length 160 millim.

Malay Archipelago, New Guinea, and South Pacific Islands.

| | | |
|---|---|---|
| *a.* Hgr. | Java. | |
| *b–f.* Ad. & hgr. | Manado, Celebes. | Dr. A. B. Meyer [C.]. |
| *g–i, k–l.* Ad., hgr., & yg. | Amboyna. | |
| *m.* Ad. | Misol. | |
| *n–u.* Hgr. & yg. | Shortland Ids., Solomons. | H. B. Guppy, Esq. [P.]. |
| *v–w.* Hgr. | Treasury Id., Solomons. | H. B. Guppy, Esq. [P.]. |
| *x.* Hgr. | Bonham Ids. | Museum Godeffroy. |
| *y.* Hgr. | Savaii, Samoa Ids. | Rev. S. J. Whitmee [P.]. |
| *z–α.* Ad. | Fiji Ids. | J. Macgillivray, Esq. [C.]. |
| *β–γ.* Ad. | Viti Levu. | Museum Godeffroy. |
| *δ.* Hgr. | Tahiti. | Museum Godeffroy. |

### 4. Kuhlia tæniura.

Dules tæniurus, *Cuv. & Val.* iii. p. 114* (1829); *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 49; *Günth.* i. p. 267 (1859); *Kner, Novara, Fische*, p. 47 (1865).

Perca argentea, *Bennett, Fish. Ceylon*, pl. xxii. (1830).

Dules bennetti, *Peters, Mon. Berl. Ac.* 1855, p. 432; *Günth. t. c.* p. 270.

Dules argenteus, *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 62; *Günth. Fische d. Südsee*, p. 25, pl. xix. fig. C (1873); *Day, Fish. Ind.* p. 67, pl. xviii. fig. 2 (1875), *and Faun. Ind., Fish.* i. p. 504 (1889).

Paradules tæniurus, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1871, p. 130.

Moronopsis tæniurus, *Bleek. Arch. Néerl.* vii. 1872, p. 74, *and Atl. Ichth.* vii. p. 119, pl. cccxlv. fig. 5 (1876).

Moronopsis argenteus, *Klunz. Fische Roth. Meer.* p. 25 (1884).

Kuhlia argo, *Jord. & Bollm. Proc. U.S. Nat. Mus.* xii. 1889, p. 159; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 419.

Kuhlia tæniura, *Jord. & Bollm. l. c.*

D. X 9–11. A. III 10–11. Sc. 50–55 $\frac{5}{13-14}$.

Depth of body $2\frac{3}{4}$ to 3 times in total length, length of head $3\frac{1}{4}$ to $3\frac{2}{3}$ times. Snout $\frac{2}{3}$ diameter of eye, which is $2\frac{2}{3}$ to $3\frac{1}{4}$ times in length of head, and equals interorbital width; lower jaw projecting; maxillary extending to below anterior border or anterior third of

* Type (Paris Mus. no. 994) examined.

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eye, the width of its distal extremity $\frac{1}{4}$ to $\frac{1}{3}$ diameter of eye; cheeks and opercles with large ctenoid scales; angle and lower border of præopercle finely denticulated; lower opercular spine strong. 25 or 26 gill-rakers on lower part of anterior arch. Dorsal originating just behind vertical of axilla; fifth or fourth and fifth spines longest, $\frac{3}{5}$ to $\frac{2}{3}$ length of head, longer than anterior soft rays; tenth spine longer than ninth, as long as third or a little shorter. Pectoral $\frac{2}{3}$ length of head. Ventral a little shorter, reaching anus, or not quite so far. Anal as long as or slightly longer than its distance from the caudal; third spine a little longer than second, as long as tenth dorsal. Caudal deeply forked, middle rays $\frac{1}{3}$ to $\frac{2}{5}$ length of outer. Silvery, bluish grey on the back; top of soft dorsal blackish; caudal with five black bands, one along the middle rays, and two pairs converging posteriorly.

Total length 200 millim.

East and South Africa, Islands of the Indian and Tropical Pacific Oceans.

| | | |
|---|---|---|
| *a–b.* Hgr. | Socotra. | Prof. I. B. Balfour [C.]. |
| *c.* Yg. | Zanzibar. | Sir J. Kirk [C.]. |
| *d.* Ad. | Seychelles. | S. Ward, Esq. [P.]. |
| *e–f.* Hgr. | Port Natal. | Mr. T. Ayres [C.]. |
| *g.* Hgr. | S. Africa? | Sir A. Smith [P.]. |
| *h.* Ad. | Mauritius. | Royal College of Surgeons. |
| *i.* Hgr. | Ancutta Id., Laccadives. | Dr. Alcock [P.]. |
| *k–m.* Hgr. & yg. | China. | Sir E. Belcher [P.]. |
| *n.* Ad. | Tahiti. | Museum Godeffroy. |

### 5. Kuhlia malo.

Dules malo, *Cuv. & Val.* vii. p. 479 (1831); *Günth.* i. p. 270 (1859).
Dules mato, *Lesson, Voy. Coquille, Zool.* ii. p. 223 (1831).
Dules leuciscus, *Jenyns, Zool. Beagle, Fish.* p. 17 (1842).
Dules marginatus, part., *Günth. Fische d. Südsee*, p. 24 (1873).
Moronopsis argenteus, var. sandvicensis, *Steind. Sitzb. Ak. Wien*, lxxiv. i. 1876, p. 205.
Dules humilis, *De Vis, Proc. Linn. Soc. N.S.W.* ix. 1884, p. 396.
Moronopsis sandvicensis, *Steind. Sitzb. Ak. Wien*, xcvi. 1887, p. 56, pl. i. fig. 1.

D. X 11. A. III 11. Sc. 53–56 $\frac{5-6}{14-15}$.

Depth of body $2\frac{2}{3}$ to 3 times in total length, length of head $3\frac{1}{3}$ to $3\frac{2}{3}$ times. Snout $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye, which is $2\frac{1}{2}$ to 3 times in length of head; interorbital width 3 times in length of head; lower jaw projecting; maxillary extending to below anterior border of eye or a little beyond, the width of its distal extremity $\frac{1}{4}$ to $\frac{1}{3}$ diameter of eye; cheeks and opercles with large ctenoid scales; angle and lower border of præopercle finely denticulated; lower opercular spine strong. 25 to 28 gill-rakers on lower part of anterior arch. Dorsal originating just behind vertical of axilla; fifth dorsal spine longest, $\frac{1}{2}$ to $\frac{2}{3}$ length of head, a little longer than anterior soft

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rays; tenth spine longer than ninth, as long as or a little shorter than third. Pectoral $\frac{2}{3}$ length of head. Ventral usually a little shorter, reaching anus or not quite so far. Anal longer than its distance from the caudal; third spine a little longer than second, nearly as long as tenth dorsal. Caudal deeply forked, middle rays $\frac{1}{3}$ to $\frac{2}{5}$ length of outer. Silvery, back darker; caudal with blackish posterior edge.

Total length 235 millim.

South Africa; Islands of the Indian and Tropical Pacific Oceans; Queensland.

| | | |
|---|---|---|
| *a*. Hgr., stffd. | S. Africa. | Sir A. Smith [P.]. |
| *b*. Ad. | Mauritius. | Officers of Chatham Mus. [P.]. |
| *c–d*, *e*. Ad. & hgr. | Rodriguez. | G. Gulliver, Esq. [P.]. |
| *f–g*. Yg. | Fiji Ids. | J. Macgillivray, Esq. [C.]. |
| *h*. Hgr. | Viti Levu. | Mus. Godeffroy. |
| *i*. Ad. | Tahiti. | Mus. Godeffroy. |
| *k–n*. Ad., hgr., & yg. | Sandwich Ids. | Hawaian Government [P.]. |
| *o*. Ad. | Hilo Hawaii. | H.M.S. 'Challenger.' |
| *p*. Ad., skel. | Rodriguez. | G. Gulliver, Esq. [P.]. |

### 6. Kuhlia caudovittata.

Holocentrus caudavittatus, *Lacép. Poiss.* iv. pp. 332 & 367* (1802).
Dules caudavittatus, *Cuv. & Val.* iii. p. 117 (1829), *and* vii. p. 475 (1831); *Günth.* i. p. 267 (1859); *Sauv. Hist. Madag., Poiss.* p. 151, pl. xviii. fig. 3 (1891).

D. X 11–13. A. III 12–13. Sc. 52–55 $\frac{5-6}{14-16}$.

Depth of body $2\frac{3}{5}$ to 3 times in total length, length of head $3\frac{3}{4}$ to 4 times. Snout $\frac{2}{5}$ diameter of eye, which is contained 3 times in length of head and equals interorbital width; lower jaw projecting; maxillary extending to below anterior border or anterior third of eye, the width of its distal extremity nearly $\frac{1}{3}$ diameter of eye; cheeks and opercles with large ctenoid scales; angle and lower border of præopercle finely denticulated; lower opercular spine strong. 25 to 28 gill-rakers on lower part of anterior arch. Dorsal originating just behind vertical of axilla; fifth spine longest, $\frac{1}{2}$ to $\frac{2}{3}$ length of head, longer than anterior soft rays; tenth spine not or but very slightly longer than ninth. Pectoral $\frac{2}{3}$ length of head. Ventral a little shorter, not reaching anus. Anal much longer than its distance from the caudal. Caudal deeply forked, middle rays not more than $\frac{2}{5}$ length of outer. Silvery, bluish grey on the back; caudal with an angular blackish band within the border, which is edged with blackish.

Total length 190 millim.

Madagascar, Mascarene Islands, Society Islands.

| | | |
|---|---|---|
| *a*. Ad. | Tahiti. | Mus. Godeffroy. |

* The type is missing in the Paris Museum. The specimens mentioned in the 7th vol. of Cuvier and Valenciennes's work are preserved (no. 992) and have been examined by me.

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# Fam. 2. PERCIDÆ.

No subocular lamina of the suborbitals; entopterygoid present. Anterior vertebræ without transverse processes; all or most of the ribs inserted on the transverse processes. Two nostrils on each side. Gill-membranes free from isthmus; six to eight branchiostegals; gills four, a slit behind the fourth; pseudobranchiæ more or less developed, often rudimentary, rarely absent. Pharyngeal bones separate. Soft portion of dorsal fin not very much more developed than the anal; latter with one or two spines.

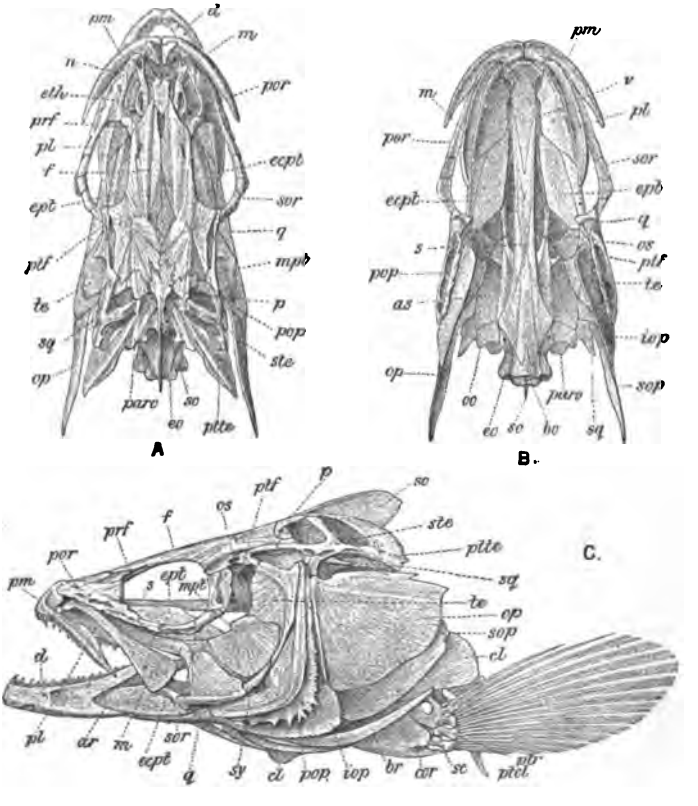


Fig. 5.—*Lucioperca volgensis.*

A. Upper view of skull. B. Lower view of skull. C. Side view of skull and pectoral arch. Lettering same as on fig. 1, p. 3.

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The maxillary, which is devoid of supplemental bone, is exposed, except in *Diplesium*, *Aspro*, and *Acerina*, in which it is entirely concealed under the præorbital when the mouth is closed; only a small portion of it is visible in *Percina*, *Etheostoma*, *Boleosoma*, *Ulocentra*, and *Ammocrypta*, its upper border slipping for its whole length under the præorbital. The cranial differences between the various forms are mostly confined to the general configuration and the development of muciferous channels and pits, and do not afford much help in the definition of systematic divisions. Even the most aberrant genera depart but slightly from the type of *Perca*. The posterior processes of the præmaxillaries are short; the supraoccipital and parietal bones are short and confined to the back of the skull; parietal crests are absent and the supraoccipital crest is very short, not extending to the anterior extremity of the bone, or even absent, as in *Boleosoma*, *Diplesium*, and some species of *Etheostoma*. The body is more or less elongate, compressed, cylindrical, or even a little depressed. The scales are small and ciliated. The lateral line is present or absent. 30 to 48 vertebræ, 13 to 25 præcaudal and 16 to 26 caudal. The modifications of the vertebral column, in the skeletons examined by me, may be tabulated as on page 5:—

| | A. | B. | C. | D. | E. | F. | G. | H. |
|---|---|---|---|---|---|---|---|---|
| *Perca fluviatilis* | 41 | 22 | 2 | 3 | 4 | 12 | 2 | 19 |
| —— *flavescens* | 41 | 22 | 2 | 3 | 3 | 14 | 1 | 19 |
| *Lucioperca volgensis* | 43 | 22 | 2 | 6 | 1 | 12 | 1 | 21 |
| —— *sandra* | 46 | 25 | 2 | 6 | 2 | 14 | 1 | 21 |
| —— *vitrea* | 46 | 25 | 2 | 6 | 2 | 14 | 1 | 21 |
| *Percina caprodes* * | 44 | 22 | 2 | 0 | 0 | 19 | 0 | 22 |
| *Aspro asper* | 44 | 20 | 2 | 2 | 0 | 14 | 0 | 24 |
| —— *zingel* | 48 | 22 | 2 | 2 | 0 | 18 | 0 | 26 |
| *Percarina demidoffii* | 33 | 14 | 2 | 3 | 2 | 6 | 3 | 19 |
| *Acerina cernua* | 34 | 15 | 2 | 3 | 1 | 9 | 2 | 19 |

The figures given on the following page represent the six types recorded in columns C to H.

* The following are the numbers of vertebræ in the dwarfed North-American Percoids, as recorded by Jordan and Eigenmann, Proc. U.S. Nat. Mus. viii. 1885, p. 68:—

| | | | |
|---|---|---|---|
| *Percina caprodes* | 23+21=44 | *Etheostoma whipplii* | 15+21=36 |
| —— *aspro* | 19+23=42 | —— *flabellare* | 13+20=33 |
| —— *peltata (evides)* | 18+22=40 | —— *microperca* | 14+16=30 |
| —— *phoxocephala* | 19+20=39 | *Boleosoma copelandi* | 18+20=38 |
| *Etheostoma scierum* | 18+22=40 | —— *camurum* | 17+21=38 |
| —— *zonale* | 16+23=39 | —— *nigrum(maculatum)* | 15+22=37 |
| —— *maculatum* | 15+24=39 | *Ulocentra simotera* | 15+23=38 |
| —— *fusiforme* | 16+20=36 | *Diplesium blennioides* | 19+23=42 |
| —— *variatum* | 15+21=36 | *Ammocrypta pellucida* | 23+21=44 |
| —— *lepidum* | 16+19=35 | —— *vivax* | 21+20=41 |

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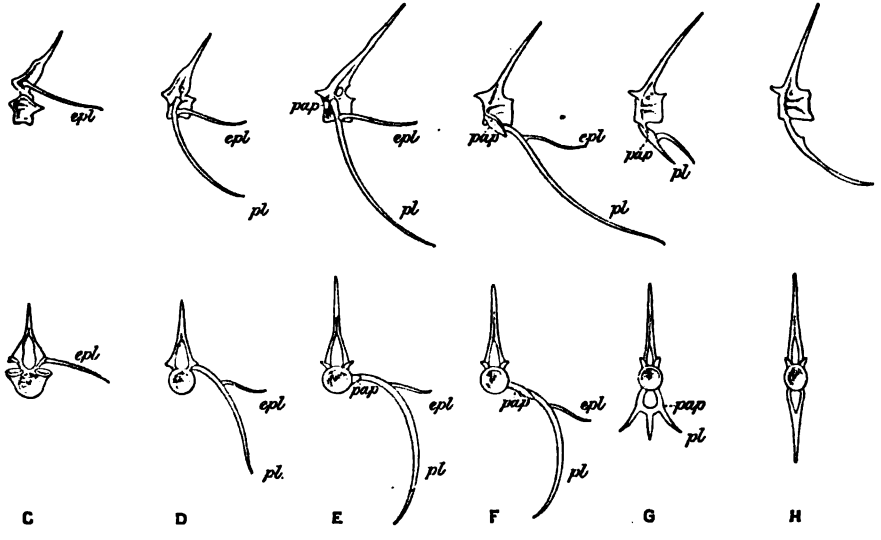


Fig. 6.—Vertebræ of *Perca fluviatilis*.
Side view and front view.
C. 1st vertebra; D. 3rd; E. 6th; F. 13th; G. 20th; H. 22nd.
Lettering same as on fig. 2, p. 4.

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Only the first pterygial is in contact with the coracoid, or the first and a portion of the second. An anal papilla is more or less distinct in all the members of this family. The air-bladder is present, though sometimes very small.

Carnivorous fishes inhabiting the fresh waters of North America and Western Eurasia, *Lucioperca* and *Percarina* entering salt water.

*Synopsis of the Genera.*

I. Head with the muciferous cavities moderately or feebly developed above and on the sides; dorsal fins distinct.

A. Body more or less compressed.

1. Seven (exceptionally eight) branchiostegals; maxillary large, exposed, free behind; præmaxillaries protractile; præopercle serrated.

No canine teeth; ventrals close together / 1. PERCA, p. 46.
More or less enlarged canine teeth; ventrals separated by an interspace at least equal to two-thirds the width of their base .. 2. LUCIOPERCA, p. 50.

2. Six branchiostegals; maxillary small, its upper border, if free, entirely or nearly entirely slipping under the præorbital.

*a.* Maxillary free from præorbital.

*a.* Præmaxillaries free only at the sides.

Ventrals separated by an interspace equal to the width of their base ..... 3. PERCINA, p. 56.
Ventrals separated by an interspace considerably less than the width of their base 4. ETHEOSTOMA, p. 64.

*β.* Præmaxillaries protractile, entirely free from the skin of the snout.

Ventrals separated by an interspace nearly equal to the width of their base ..... 5. BOLEOSOMA, p. 90.
Ventrals narrowly separated ..... 6. ULOCENTRA, p. 96.

*b.* Maxillary adnate to præorbital; ventrals narrowly separated. 7. DIPLESIUM, p. 100.

B. Body cylindrical or somewhat depressed.

*a.* Maxillary exposed, its upper border slipping under the præorbital; body translucent.

Præmaxillaries protractile ..... 8. AMMOCRYPTA, p. 101.
Præmaxillaries free only at the sides .... 9. CRYSTALLARIA, p. 103.

*b.* Maxillary covered by præorbital; præmaxillaries free only at the sides ..... 10. ASPRO, p. 104.

II. Head with very large muciferous cavities above and on the sides.

Two dorsals; maxillary exposed, free behind ..... 11. PERCARINA, p. 108.
Dorsals united; maxillary covered by præorbital ..... 12. ACERINA, p. 109.

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## 1. PERCA.

Perca, part., *Artedi, Ichth.* iv. p. 39 (1738); *Linn. Syst. Nat.* i. p. 481 (1766); *Cuv. & Val.* ii. p. 19 (1828).
Morone, part., *Mitchill, Rep. Fish. New York*, p. 18 (1814).
Perca, *Günth. Cat.* i. p. 58 (1859); *Bleek. Arch. Néerl.* xi. 1876, p. 265; *Jord. & Gilb. Syn. Fish. N. Am.* p. 523 (1882).
Epitrachys, *Erw. Schulze, Jahresb. nat. Ver. Magdeb.* 1889, p. 209.

Body compressed; scales rather small, rough and ciliated. Lateral line complete, the tube straight and not extending to the extremity of the scale. Mouth rather large, protractile; maxillary exposed; villiform teeth in jaws and on vomer, palatines, and ectopterygoids. Head partly naked; præopercle serrated, the spines on the lower border antrorse; opercle ending in a spine. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers moderate or short. Two dorsals, contiguous or narrowly separated, with XII-XVI, II–III 12–15 rays, the spinous fin longer than the soft. Anal short, with II 8–10 rays. Caudal emarginate. Pectorals subsymmetrical, rounded, with 14–15 rays. Ventrals behind base of pectoral, close together, with a strong spine. Vertebræ 41–42 (21 + 20–21).

Fresh waters of Europe, Central and Northern Asia, and Eastern North America.

*Synopsis of the Species.*

I. Spinous dorsal considerably deeper than soft dorsal.

D. XIV-XVI, II 13–15; first dorsal spine at least as long as, and usually longer than, first anal; Sc. 80–98 $\frac{8-10}{17-20}$; l. l. 58–67 ..... 1. *fluviatilis*, p. 46.

D. XIII-XV, II 13–15; first dorsal spine usually shorter than first anal; Sc. 74–88 $\frac{6-8}{16-19}$; l. l. 54–62 ..... 2. *flavescens*, p. 48.

II. Spinous dorsal not or but little deeper than soft dorsal; D. XII-XIII, II–III 12–13; first dorsal spine shorter than first anal; Sc. 62–75 $\frac{6-7}{15-18}$; l. l. 46–54 ..... 3. *schrenkii*, p. 49.

### 1. Perca fluviatilis.

Perca fluviatilis, *Linn. S. N.* i. p. 481 (1766); *Bloch, Fische Deutschl.* ii. p. 66, pl. lii. (1783); *Meidinger, Icon. Pisc. Austr.* pl. v. (1786); *Lacép. Poiss.* iv. p. 399 (1802); *Donovan, Brit. Fish.* iii. pl. lii. (1802); *Pallas, Zoogr. Ross.-As.* iii. p. 248 (1811); *Jurine, Mém. Soc. Phys. Genève*, iii. 1825, p. 152, *Atl.* pl. iii.; *Cuv. & Val.* ii. p. 20 (1828); *Yarr. Brit. Fish.* p. 1, fig. (1836); *Bonap. Icon. Faun. Ital., Pesci* (1835); *Fries & Ekstr. Skand. Fisk.* p. 1, pl. i. fig. 1 (1836); *Kröyer, Danm. Fisk.* i. p. 1 (1838); *Yarr. Brit. Fish.* 2nd ed. p 1, fig. (1841); *Günth. Fisch. Neck.* p. 10 (1853); *Nilss. Skand. Faun., Fisk.* p. 5 (1855); *Heck. & Kner, Süsswasserf. Oesterr.* p. 3, fig. (1858); *Günth.* i. p. 58 (1859); *Couch, Brit. Fish.* i. p. 185, pl. xxxix. (1862); *Schleg. Dier. Nederl.* p. 32, pl. iii. fig. 2 (1862); *Siebold, Süsswasserf. Mitteleur.* p. 44 (1863); *Kessler, Invest. N. H. St. Petersb. Gov.* i. p. 19 (1864); *Blanch. Poiss. Fr.* p. 130, figs. (1866);

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*Lunel, Poiss. Léman*, p. 3, pl. i (1874); *Dybowski, Verh. zool.-bot. Ges. Wien*, xxiv. 1874, p. 383; *Canestrini, Faun. Ital., Pesci*, p. 9 (1874); *Malm, Göteb. Faun.* p. 374 (1877); *Houghton, Brit. Freshw. Fish.* p. 1, pl. — (1879); *Day, Fish. Gr. Brit.* p. 2, pl. i. (1880); *Benecke, Fisch. O. u. Westpreuss.* p. 61, fig. (1881); *Moreau, Poiss. Fr.* ii. p. 328 (1881); *Lilljeb. Sver. o. Norg. Fisk.* i. p. 46 (1881); *Fatio, Vert. Suisse*, iv. p. 11 (1882); *Sundman & Reuter, Finl. Fisk.* pl. ix. (1884); *Seeley, Freshw. Fish. Eur.* p. 23 (1886); *Döderl. Man. Ittiol. Mediterr.* iv. p. 10 (1889); *Smitt, Scand. Fish.* i. p. 26, pl. iii. fig. 1 (1893).

Perca vulgaris, *Agass. Isis*, 1828, p. 1047; *Gronow, Cat.* p. 114 (1854).

Perca italica, *Cuv. & Val.* ii. p. 45.

Perca helvetica, *Gronow, l. c.* p. 113.

D. XIV–XVI, II 13–15. A. II 8–10. Sc. 80–98 $\frac{8-10}{17-20}$; l. l. 58–67.

Greatest depth at origin of dorsal fin, 3 to 5 times in total length; profile convex from dorsal to occiput, thence concave to the snout, which is again convex; length of head $3\frac{1}{2}$ to $4\frac{1}{2}$ times in total. Diameter of eye equal to length of snout or rather less, $\frac{1}{4}$ to $\frac{1}{5}$ length of head, and less than interorbital width; maxillary extending to below centre of eye or a little beyond, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præorbital entire or finely serrated; head smooth and scaleless above; opercle usually not or but feebly striated, usually with a single, strong spine; gill-rakers 16 to 18 on lower part of anterior arch, the longest $\frac{3}{5}$ to $\frac{3}{4}$ length of branchial filaments; pseudobranchial filaments $\frac{1}{2}$ to $\frac{2}{3}$ the length of the branchials. Dorsal originating a little in advance of base of pectoral; length of the spinous dorsal $\frac{1}{3}$ to $\frac{2}{5}$ total length, of soft dorsal $\frac{1}{6}$ to $\frac{1}{5}$; first dorsal spine $\frac{2}{3}$ to $\frac{5}{6}$ length of second, $\frac{3}{5}$ to $\frac{2}{3}$ length of longest (4th, 5th, or 6th), which exceeds the longest branched rays. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head. First anal spine a little shorter than second, which measures $\frac{3}{5}$ to $\frac{4}{5}$ the longest branched rays, as long as or shorter than first dorsal spine. Middle caudal rays about $\frac{2}{3}$ length of outer. Olive above, passing to yellowish beneath, usually with from five to seven vertical dark bars, lost on the sides, the first below the origin of the dorsal fin; spinous dorsal greyish, with a deep black spot behind and sometimes another in front; ventrals and anal orange or red.

Total length 450 millim.

Europe (except the Spanish peninsula), Transcaspia, Siberia as far east as Lake Baical. Introduced in New South Wales.

| | | |
|---|---|---|
| *a, b, c.* Ad. & yg., stffd. & skins. | Loch Maben, Scotland. | |
| *d.* Ad., stffd. | Loch Lomond. | |
| *e.* Ad., skin. | Norfolk. | Yarrell Collection. |
| *f–g.* Yg. | London. | Yarrell Collection. |
| *h–l.* Hgr. & yg. | Thames at Hampton, Middlesex. | Mr. E. Dodson [P.]. |
| *m.* Yg., skin. | England. | Yarrell Collection. |
| *n.* Ad., stffd. | England. | |

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| | | |
|---|---|---|
| *o.* Ad., skin. | Sweden. | Yarrell Collection. |
| *p–q, r.* Ad. & yg. | R. Gotha, Sweden. | Lloyd Collection. |
| *s–v.* Ad. & hgr. | Lapland. | |
| *w–y.* Hgr. | Switzerland. | Prof. L. Agassiz [P.]. |
| *z.* Yg., skin. | Basle. | Gronow Collection. (Type of *P. helvetica*.) |
| *α.* Ad. | R. Amper, Bavaria. | Dr. Gemminger [C.]. |
| *β.* Yg. | Transylvania. | C. G. Danford and J. A. H. Brown, Esqrs. [P.]. |
| *γ–δ.* Ad. | Oural, near Orenburg. | M. Nazarow [E.]. |
| *ε.* Hgr. | R. Sosva, Lower Obi Basin. | Moscow University [E.]. |
| *ζ.* Ad. | R. Polui, near Obdorsk, Lower Obi. | Dr. O. Finsch [C.]. |
| *η.* Yg., skin. | —— ? | Gronow Collection. |
| *θ, ι.* Ad., skel. | England. | |
| *κ.* Ad., skull. | Berlin. | Dr. Günther [C.]. |

## 2. Perca flavescens.

Perca americana (*non Gm.*), *Schranck, Abh. Privatges. Oberdeutschl.* i. 1792, p. 98; *Jord. Geol. Surv. Ohio*, iv. p. 958 (1882); *Jord. & Gilb. Syn. Fish. N. Am.* p. 524 (1882); *Goode, Fish. & Fisher. Industr. U.S.* i. p. 414, pl. clxviii (1884).

Morone flavescens, *Mitchill, Rep. Fish. New York*, p. 18 (1814).

Centropomus luteus, *Rafin. Précis des Découv. Somiolog.* p. 19 (1814).

Bodianus flavescens, *Mitchill, Trans. Lit. & Phil. Soc. N. Y.* 1815, p. 421.

Perca flavescens, *Cuv. & Val.* ii. p. 46 (1828); *Richards. Faun. Bor.-Am., Fish.* p. 1, pl. lxxiv. (1836); *Storer, Rep. Fish. Mass.* p. 5 (1839), *and Bost. Journ. N. H.* iv. 1844, p. 176; *De Kay, N. York Faun., Fish.* p. 3, pl. i. fig. 1 (1842); *Kirtland, Bost. Journ. N. H.* v. 1847, p. 337, pl. xxvii. fig. 2; *Agass. Lake Super.* p. 291 (1850); *Storer, Mem. Amer. Acad.* (2) v. 1853, p. 52, pl. ii. fig. 1; *Günth.* i. p. 59 (1859); *Holbr. Ichth. S. Carol.* p. 2, pl. i. fig. 1 (1860); *Eigenmann, Proc. Ac. Philad.* 1887, p. 295.

Perca serrato-granulata, *Cur. & Val.* ii. p. 47; *Guér. Icon. R. An., Poiss.* pl. i. fig. 1 (1829); *De Kay, l. c.* p. 5.

Perca granulata, *Cuv. & Val.* ii. p. 48, pl. ix.; *De Kay, l. c.*; *Storer, Bost. Journ. N. H.* iv. 1844, p. 176.

Perca acuta, *Cuv. & Val.* ii. p. 49, pl. x.; *Richards. l. c.*; *De Kay, l. c.* p. 6; *Günth.* i. p. 60.

Perca gracilis, *Cuv. & Val.* ii. p. 50; *Richards. l. c.*; *De Kay, l. c.*; *Günth. l. c.*

Perca fluviatilis, var. flavescens, *Steind. Sitzb. Ak. Wien*, lxxviii. 1878, p. 24.

Perca fluviatilis, *Kilbourne & Goode, Game Fish. U. S.* pl. — (1879).

Perca fluviatilis, part., *Day, Fish. Gr. Brit.* p. 2 (1880); *Goode, Am. Fish.* p. 1, fig. (1888).

Perca lutea, *Jord. Proc. U.S. Nat. Mus.* viii. 1885, p. 72.

D. XIII–XV, II 13–15. A. II 8. Sc. 74–88 $\frac{6-8}{16-19}$; l. l. 54–62.

General proportions as in *P. fluviatilis*, but head usually somewhat longer, its length sometimes but slightly less than $\frac{1}{3}$ of the

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total. Diameter of eye a little shorter than snout, and equal to or but slightly less than interorbital width; maxillary often not reaching centre of eye; upper surface of head rougher; opercle more or less strongly striate, or rough with granulations, usually with one or several small spines below the large one. Gill-rakers 14 to 16 on lower part of anterior arch, the longest $\frac{1}{3}$ to $\frac{2}{3}$ length of branchial filaments; pseudobranchial filaments about one third the length of the branchials. Dorsal originating above or a little behind base of pectoral; first dorsal spine $\frac{1}{3}$ to $\frac{2}{3}$ length of second, $\frac{1}{4}$ to $\frac{2}{5}$ length of longest (4th or 5th). First spine of anal a little shorter than second, usually longer than first dorsal. Olive above, passing to yellowish beneath, with five to ten vertical dark bars, lost on the sides, the first in advance of the dorsal fin; spinous dorsal greyish, with or without a large black spot in the anterior and posterior portions; ventrals and anal orange or red.

Total length 270 millim.

Eastern North America, from Labrador to Georgia; in the United States not extending west of the Mississippi.

| | | |
|---|---|---|
| *a*, *b*. Ad., stffd. | Canada. | |
| *c*. Several specs., hgr. & yg. | Fort Qu'Appelle, Assiniboia. | Prof. Eigenmann [C.]. |
| *d*–*i*. Yg. | Brandon, Manitoba. | Prof. Eigenmann [C.]. |
| *k*. Hgr. | Nova Scotia. | |
| *l*–*r*. Ad., hgr., & yg. | New England. | Mus. Compar. Zool. |
| *s*. Ad. | Maine. | Mus. Compar. Zool. |
| *t*. Ad. | Boston. | J. Wimstone, Esq. [P.]. |
| *u*, *v*. Ad. & hgr. | Connecticut R. | Smithsonian Instit. |
| *w*. Ad. | New York. | |
| *x*. Ad. | Potomac R. | Smithsonian Instit. |
| *y*–*α*. Ad. | Toledo, Lake Erie. | |
| *β*. Yg. | St. Mary's, L. Michigan. | U.S. Fish Commission. |
| *γ*. Ad. | L. Michigan. | Prof. D. S. Jordan. |
| *δ*–*ε*. Hgr. | Bay View, Michigan. | Prof. Eigenmann [C.]. |
| *ζ*–*η*. Yg. | Minnesota R., Ortonsville, Minn. | Prof. Eigenmann [C.]. |
| *θ*–*κ*. Yg. | Red Lake R., Crookston, Minn. | Prof. Eigenmann [C.]. |
| *λ*, *μ*. Ad., skins. | Montezuma, Iowa. | Parnell Collection. |
| *ν*. Ad., stffd. | N. America. | E. Doubleday, Esq. [P.]. |
| *ξ*. Ad., skel. | Ohio. | |

### 3. Perca schrenkii.

Perca schrenkii, *Kessler, in Fedtschenko, Reise in Turkest.* i. p. 50, pl. viii. fig. 35 (1874); *Nicolsky, Mél. Biol. Ac. St. Pétersb.* xii. 1884, p. 216, *and Trud. St. Petersb. Nat.* xix. 1888, p. 162.

D. XII–XIII, II–III 12–13. A. II 8–9.

Sc. 62–75 $\frac{6-7}{15-18}$; l. l. 46–54.

Greatest depth at origin of dorsal fin, about $3\frac{1}{2}$ times in total length; profile of nape convex, of top of head slightly concave; length of head 3 to $3\frac{1}{3}$ times in total. Diameter of eye less than length of snout, not or but slightly more than interorbital width,



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about $\frac{1}{5}$ length of head; maxillary extending to below centre of eye or a little beyond, the width of its distal extremity $\frac{2}{3}$ to $\frac{3}{4}$ diameter of eye; præorbital denticulated; head smooth and scaleless above; opercle not striated, with a single spine. Gill-rakers 20 to 22 on lower part of anterior arch, the longest $\frac{2}{3}$ to $\frac{4}{5}$ length of branchial filaments; pseudobranchial filaments about half length of branchials. Dorsal originating above or a little behind base of pectoral; length of spinous dorsal $\frac{1}{4}$ to $\frac{1}{5}$ total length, of soft dorsal $\frac{1}{5}$ to $\frac{1}{6}$; first dorsal spine about $\frac{1}{2}$ length of second, $\frac{1}{3}$ to $\frac{2}{5}$ length of longest (4th), which equals or but slightly exceeds the longest branched rays (the spinous dorsal comparatively deeper in the young). Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. First anal spine shorter than second and longer than first dorsal spine. Middle caudal rays about $\frac{2}{3}$ length of outer. Olive above, silvery beneath, uniform in the adult, with 13 blackish vertical bars in the young.

Total length 250 millim.; reaches to 310 millim.

Turkestan.

| | | |
|---|---|---|
| *a–c.* Hgr. & yg. | L. Sassyk-kul. | Dr. O. Finsch [C.]. |
| *d.* Ad. | L. Sassyk-kul. | St. Petersburg Museum. |
| *e.* Ad. | Khuldscha. | St. Petersburg Museum. |

## 2. LUCIOPERCA.

Centropomus, part., *Lacép. Poiss.* iv. p. 248 (1802).
Lucioperca, *Cuv. R. An.* ii. p. 294 (1817); *Cuv. & Val.* ii. p. 110 (1828); *Günth. Cat.* i. p. 74 (1859).
Stizostedion, *Rafin. Ichth. Oh.* p. 23 (1820); *Jordan & Gilb. Syn. Fish. N. Am.* p. 525 (1882); *Gill, Proc. U.S. Nat. Mus.* xvii. 1894, p. 123.
Sandat, *Cloquet, Dict. Sc. Nat.* xlvii. p. 173 (1827).
Sandrus, *Stark, Elem. N. H.* i. p. 465 (1828).
Schilus, *Krynicki, N. Mém. Soc. Nat. Mosc.* ii. 1832, p. 443.
Centropomus, *Bleek. Arch. Néerl.* xi. 1876, p. 265.
Stizostethium, *Jord. & Gill, Bull. U.S. Nat. Mus.* no. 10, 1877, p. 43.
Cynoperca, *Jord. & Gill, l. c.* p. 45.
Mimoperca, *Jord. & Gill, l. c.*

Body elongate, compressed; scales small, rough, denticulated. Lateral line complete, more or less produced on the caudal fin; the tubes straight and occupying nearly the entire length of the scale. Mouth large, protractile; maxillary exposed; narrow bands of small teeth in jaws, and on vomer and palatines, with some on the jaws and palatines more or less enlarged and canine-like; tongue smooth; head partly naked; præopercle serrated, the spines on the lower border antrorse; opercle ending in a feeble spine. Gill-membranes separate; seven (exceptionally eight) branchiostegals; pseudobranchiæ present; gill-rakers moderate or short. Two dorsals, subequal in extent, contiguous or narrowly separated, with XII–XV, I–II 16–23 rays. Anal shorter than either dorsals, with II 9–14 rays. Caudal emarginate. Pectorals rounded, symmetrical or upper rays longest, rays 14–17. Ventrals behind the base of the

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pectorals, separated by an interspace at least equal to two thirds the width of their base, spine moderate or feeble. Vertebræ 43–46 (21–24+22).

Europe, W. Asia, E. North America.

*Synopsis of the Species.*

I. The distance between the ventrals about two thirds the width of their base; ventral and anal spines free; pectoral fin symmetrical.

Canine teeth weak, or altogether absent in old specimens; D. XII–XIV, I–II 21–22; A. II 9–10; Sc. 110–117 $\frac{10-12}{21-28}$; l. l. 71–83 ..... 1. *volgensis*, p. 51.

Canine teeth strong; D. XIII–XV, I–II 19–23; A. II 11–12; Sc. 132–150 $\frac{13-16}{30-35}$; l. l. 80–95 .. 2. *sandra*, p. 52.

II. The distance between the ventrals about two thirds the width of their base; ventral and anal spines very feeble and closely attached to the soft rays.

D. XII–XIII, I–II 16–17; A. II 11–12; Sc. 115 $\frac{10}{30}$; l. l. 78–84 ..... 3. *marina*, p. 53.

III. The distance between the ventrals equals the width of their base; ventral and anal spines very feeble and closely attached to the soft rays; pectoral fin asymmetrical, the upper rays longest.

Back somewhat flattened; D. XI–XV, I–II 17–19; A. II. 11–12; Sc. 100–125 $\frac{9-11}{22-28}$; l. l. 80–92..... 4. *canadensis*, p. 54.

Back compressed; D. XII–XV, I–II 19–21; A. II 12–14; Sc. 110–135 $\frac{9-13}{21-28}$; l. l. 83–95 ..... 5. *vitrea*, p. 55.

## 1. Lucioperca volgensis.

Perca volgensis, *Pall. Reise*, i. p. 461 (1776).
Perca asper, *Pall. Zoogr. Ross.-As.* iii. p. 247 (1811).
Lucioperca volgensis, *Cuv. & Val.* ii. p. 117 (1828), & vii. p. 441 (1831); *Nordm. in Démid. Voy. Russ. Mér.* iii. p. 363, pl. i. fig. 2 (1840); *Günth. Arch. f. Nat.* 1855, p. 210; *Kessl. Bull. Soc. Nat. Mosc.* 1856, p. 339; *Heck. & Kner, Süsswasserf. Oesterr.* p. 12, fig. (1858); *Günth.* i. p. 74 (1859); *Jeitteles, Verh. zool.-bot. Ges. Wien*, xii. 1862, pp. 113 & 290; *Seeley, Freshw. Fish. Eur.* p. 43 (1886).
Schilus pallasii, *Krynicki, N. Mém. Soc. Nat. Mosc.* ii. 1832, p. 443, pl. xxv.
Stizostethium (Mimoperca) volgense, *Jord. & Gill, Bull. U.S. Nat. Mus.* no. 10, 1877. p. 50.

D. XII–XIV, I–II 21–22. A. II 9–10.
Sc. 110–117 $\frac{10-12}{21-2}$; l. l. 71–83.

Depth of body 4 to $4\frac{3}{4}$ times in total length, length of head $3\frac{1}{3}$ to 4 times. Diameter of eye a little less than length of snout, about $\frac{1}{3}$ length of head, and nearly equal to interorbital width; enlarged,



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canine-like teeth feebly developed, or scarcely distinct in old specimens; maxillary reaching to below centre of eye or a little beyond, the width of its distal extremity about ½ diameter of eye; præopercular, opercular, and occipital regions covered with scales; opercular spine feeble, often obtuse. Dorsal originating just behind vertical of axilla; the two portions contiguous, the spinous exactly as long as or slightly shorter than the soft and equally deep; first spine ⅔ to ¾ length of second, which is but little shorter than third or longest. Pectoral about ⅔ length of head. Anal as deep as or a little deeper than dorsals; spines moderate, free, first shorter than second. Ventrals separated by an interspace equal to ⅔ the width of their base; spine free. Middle caudal rays about ⅔ length of outer. Olive or brownish above, with seven to nine vertical blackish bars, the first of which is in advance of the dorsal; first dorsal with sharply marked black and white horizontal bars; second dorsal and caudal spotted with black.

Total length 420 millim. Said to reach to the same size as *L. sandra*.

Rivers of S.E. Europe, from the Danube and Dniester to the Volga; extends westwards as far as Vienna.

| | | |
|---|---|---|
| *a*. Ad. | Danube. | Hr. Jeitteles [C.]. |
| *b*. Hgr. | Samara. | St. Petersburg Museum. |
| *c*. Ad. | Astrachan. | St. Petersburg Museum. |
| *d*. Ad., skel. | Astrachan. | St. Petersburg Museum. |

### 2. Lucioperca sandra.

Perca lucioperca, *Linn. S. N.* i. p. 481 (1766); *Bloch, Fische Deutschl.* ii. p. 62, pl. li. (1783); *Meiding. Icon. Pisc. Austr.* pl. i (1786); *Pall. Zoogr. Ross.-As.* iii. p. 246 (1811); *Gronow, Cat.* p. 115 (1854).

Centropomus sandat, *Lacép. Poiss.* iv. p. 255 (1802).

Sandat lucioperca, *Cloquet, Dict. Sc. Nat.* xlvii. p. 173 (1827).

Lucioperca sandra, *Cuv. & Val.* ii. p. 110, pl. xv. (1828); *Kröyer, Danm. Fisk.* p. 32, fig. (1838); *Nordm. in Démid. Voy. Russ. Mér.* iii. p. 362 (1840); *Nilss. Skand. Faun., Fisk.* p. 22 (1855); *Günth. Arch. f. Nat.* 1855, p. 205; *Heck. & Kner, Süsswasserf. Oesterr.* p. 8, fig. (1858); *Günth.* i. p. 75 (1859); *Jeitteles, Verh. zool.-bot. Ges. Wien*, xii. 1862, pp. 114 & 289; *Siebold, Süsswasserf. Mitteleur.* p. 51 (1863); *Kessler, Invest. N. H. St. Petersb. Gov.* i. p. 22 (1864), *and in Fedtschenko, Reise in Turk.* i. p. 3 (1874); *Canestrini, Faun. Ital., Pesc.* p. 9 (1874); *Lilljeb. Sver. o. Norg. Fisk.* i. p. 59 (1881); *Benecke, Fische O. u. Westpreuss.* p. 63, fig. (1881); *Fatio, Vert. Suisse*, iv. p. 52 (1882); *Seeley, Freshw. Fish. Eur.* p. 39 (1886).

Sandrus lucioperca, *Stark, Elem. N. H.* i. p. 465 (1828).

Perca marina, *Eichw. Zool. Spec.* iii. p. 82 (1831).

Schilus lucioperca, *Krynicki, N. Mém. Soc. Nat. Mosc.* ii. 1832, p. 446.

Lucioperca linnei, *Malm, Göteb. Bohusl. Faun.* p. 379 (1877).

Stizostethium lucioperca, *Jord. & Gill, Bull. U.S. Nat. Mus.* no. 10, 1877, p. 50; *Smitt, Scand. Fish.* i. p. 36, pl. iii. fig. 2 (1893).

Lucioperca lucioperca, *Sundman & Reuter, Finl. Fisk.* pl. iii. (1883).

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D. XIII–XV, I–II 19–23. A. II 11–12.
Sc. 132–150 $\frac{13-16}{30-35}$; l. l. 80–95.

Depth of body $4\frac{1}{4}$ to $5\frac{2}{3}$ times in total length, length of head $3\frac{1}{4}$ to $3\frac{2}{3}$ times. Diameter of eye about $\frac{2}{3}$ length of snout, $\frac{1}{5}$ to $\frac{1}{7}$ length of head, and nearly equal to interorbital width; strongly enlarged canine-like teeth; maxillary reaching to below posterior border of eye, or beyond, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præopercle entirely or partly naked; opercle and top of head scaled; opercular spine feeble, often obtuse. Dorsal originating just behind vertical of axilla; the two portions contiguous or very narrowly separated, the spinous a little longer than the soft and nearly equally deep; first spine $\frac{1}{2}$ to $\frac{2}{3}$ length of second, $\frac{1}{3}$ to $\frac{2}{5}$ length of longest. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Anal as deep as or a little deeper than dorsals; spines weak, free, first shorter than second. Ventrals separated by an interspace equal to $\frac{2}{3}$ the width of their base; spine free. Middle caudal rays $\frac{2}{5}$ to $\frac{2}{3}$ length of outer. Green or olive above, silvery beneath; back and sides with large brown or blackish blotches, or with 8 to 10 more or less regular vertical bars; dorsals with black spots or horizontal bars; caudal spotted with blackish.

Total length 570 millim. Reaches a length of 1200 millim.

Eastern Europe, as far west as the Elbe, the Upper Danube, and the Adriatic, as far north as Southern Norway, Sweden, and Finland, as far south as the Danube, the Black Sea, and the Caucasus; Turkestan.

| | | |
|---|---|---|
| *a.* Ad. | Danube, near Ulm. | Stuttgart Museum. |
| *b–c.* Hgr. | Ammersee, Bavaria. | Dr. Gemminger [C.]. |
| *d.* Hgr. | Danube? | Prof. L. Agassiz [P.]. |
| *e–f.* Hgr. & yg. | Göteborg, Sweden. | Dr. A. W. Malm [P.]. |
| *g–h.* Hgr. | Gestrickland, Sweden. | |
| *i–l.* Yg. | Gotha R., Sweden. | |
| *m.* Ad. | L. Ladoga. | |
| *n.* Ad. | L. Peipus. | St. Petersburg Museum. |
| *o.* Yg. | Ostashkov. | St. Petersburg Museum. |
| *p–q.* Yg. | Astrachan. | St. Petersburg Museum. |
| *r–t.* Ad. | Oural, near Orenburg. | M. Nazarow [E.]. |
| *u–w.* Ad. | Constantinople. | Dr. Dickson [P.]. |
| *x.* Ad. | L. Derkos. | Mr. Millingen [C.]. |
| *y.* Ad., stffd. | Europe. | Yarrell Collection. |
| *z.* Hgr., skel. | Berlin. | Dr. Günther [C.]. |

### 3. Lucioperca marina.

Perca labrax (*non L.*), *Pall. Zoogr. Ross.-As.* iii. p. 243 (1811).
Lucioperca marina, *Cuv. & Val.* ii. p. 120 (1828); *Günth.* i. p. 75 (1859); *Kessl. Bull. Soc. Nat. Mosc.* 1859, p. 187, *and Fish. Aralo-Casp. Exped.* p. 4 (1877); *Bouleng. Proc. Zool. Soc.* 1892, p. 411, pl. xxv.
Stizostedion marinum, *Gill, Proc. U.S. Nat. Mus.* xvii. 1894, p. 124.

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D. XII–XIII, I–II 16–17. A. II 11–12. Sc. 115 $\frac{10}{30}$; l. l. 78–84.

Depth of body $4\frac{1}{3}$ times in total length, length of head $3\frac{2}{5}$ times. Diameter of eye about $\frac{2}{3}$ length of snout and $\frac{1}{3}$ length of head, and nearly equal to interorbital width; strongly enlarged, canine-like teeth; maxillary reaching to below posterior fourth of eye, the width of its distal extremity rather more than $\frac{1}{2}$ diameter of eye; head naked, except a few scales on the opercle; opercular spine feeble. Dorsal originating above axilla; the two portions narrowly separated, the spinous $\frac{1}{3}$ longer than the soft, and nearly equally deep; first spine $\frac{2}{3}$ length of second, $\frac{1}{2}$ length of longest. Pectoral $\frac{1}{2}$ length of head. Anal a little deeper than dorsal; spines very feeble and closely attached to the soft rays. Ventrals separated by an interspace equal to $\frac{2}{3}$ the width of their base; spine very feeble and closely attached to the soft rays. Middle caudal rays $\frac{2}{3}$ length of outer. 10 to 12 dark bars on the body; first dorsal blackish.

Total length 280 millim.

Black and Caspian Seas.

### 4. Lucioperca canadensis.

Lucioperca canadensis, *C. H. Smith, Griff. A. K.* x. p. 275, pl. i. (1834); *Richards. Faun. Bor.-Am., Fish.* p. 17 (1836); *Günth.* i. p. 75 (1859).

Lucioperca americana, *Kirtland, Bost. Journ. N. H.* iv. 1842, p. 237, pl. ix. fig. 2.

Lucioperca grisea, *De Kay, N. Y. Faun., Fish.* p. 19 (1842); *Günth. l. c.* p. 76.

Lucioperca americana, part., *Agass. Lake Super.* p. 294 (1850).

Lucioperca borea, *Girard, Proc. Ac. Philad.* 1857, p. 201.

Stizostedion boreus, *Girard, Rep. U.S. Explor. Surv. R. R.* x. pt. iv. p. 31, pl. xi. figs. 5–8 (1859).

Stizostedion grisea, *Milner, Rep. U.S. Fish. Comm.* 1872–73, p. 6 (1874).

Stizostedium canadense, *Jord. Man. Vert. N. U.S.* p. 225 (1876), *and Geol. Surv. Ohio*, iv. p. 961 (1882); *Jord. & Gilb. Syn. Fish. N. Am.* p. 526 (1882); *Goode, Fish. & Fisher. Industr. U.S.* pl. clxix. (1884), *and Am. Fish.* p. 11, fig. (1888).

Stizostethium (Cynoperca) canadense, *Jord. & Gill, Bull. U.S. Nat. Mus.* no. 10, 1877, p. 48.

D. XI–XV, I–II 17–19. A. II 11–12. Sc. 100–125 $\frac{9-11}{22-28}$; l. l. 80–92.

Very closely allied to *L. vitrea*, but form generally more elongate, the depth of the body 5 to 6 times in the total length, and back feebly compressed, somewhat flattened. Cheeks and usually crown closely scaled in the adult; opercle usually with 2 to 7 spines. Spinous portion of dorsal considerably longer than the soft. Other characters as in *L. vitrea*. Olive-grey above, sides brassy or pale orange; usually a few more or less distinct large dark blotches on each side; dorsal fins whitish, with horizontal series of black spots

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caudal, and sometimes also ventrals and anal, spotted; a more or less distinct blackish, light-edged blotch at base of pectoral.

Total length 350 millim.

Canada, Great Lakes District, Ohio, and Upper Mississippi.

| | | |
|---|---|---|
| *a*. Ad. | Montreal. | |
| *b–d*, *e–f*. Ad., hgr., & yg. | Winnipeg, Manitoba. | Prof. Eigenmann [C.]. |
| *g*. Several specs., yg. | Brandon, Manitoba. | Prof. Eigenmann [C.]. |
| *h–l*. Hgr. & yg. | Poplar, Montana. | Prof. Eigenmann [C.]. |
| *m–o*. Ad. | Toledo, L. Erie. | |
| *p*. Ad. | Ohio. | |
| *q*. Ad., skin. | Ohio R., near Portsmouth. | Parnell Collection. |
| *r*, *s*. Ad. | N. America. | Prince Max of Neuwied [P.]. |

### 5. Lucioperca vitrea.

Perca vitrea, *Mitchill, Suppl. Am. Monthly Mag.* ii. 1818, p. 247 (*fide Jordan*).
Perca salmonea, *Rafin. Am. Monthly Mag.* v. 1818, p. 354.
Stizostedion salmoneum, *Rafin. Ichth. Oh.* p. 23 (1820).
Lucioperca americana, *Cuv. & Val.* ii. p. 122, pl. xvi. (1828); *Richards. Faun. Bor.-Am., Fish.* p. 10 (1836); *De Kay, N. Y. Faun., Fish.* p. 17, pl. 50. fig. 163 (1842); *Günth.* i. p. 74 (1859).
Lucioperca americana, part., *Agass. Lake Super.* p. 294 (1850).
Stizostedium americanum, *Cope, Proc. Ac. Philad.* 1865, p. 82.
Stizostethium vitreum, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 46.
Stizostethium salmoneum, *Jord. l. c.* p. 47.
Stizostedium vitreum, *Jord. Geol. Surv. Ohio*, iv. p. 962 (1882); *Jord. & Gilb. Syn. Fish. N. Am.* p. 525 (1882); *Goode, Fish. & Fisher. Industr. U.S.* pl. clxix. (1884), *and Am. Fish.* p. 11, fig. (1888).

D. XII–XV, I–II 19–21. A. II 12–14. Sc. 110–135 $\frac{9-13}{21-28}$; l. l. 83–95.

Depth of body $4\frac{1}{2}$ to $5\frac{1}{2}$ times in total length, length of head $3\frac{1}{2}$ to 4 times. Diameter of eye about $\frac{2}{3}$ length of snout, $\frac{1}{5}$ to $\frac{2}{5}$ length of head, and nearly equal to interorbital width; strongly enlarged, canine-like teeth; maxillary reaching to below posterior third or to posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye; cheeks naked or scaly; top of head with a few scales; opercular spine strong, simple or bicuspid. Dorsal originating above axilla; the two portions well separated, the spinous a little longer and a little deeper than the soft; first spine about $\frac{2}{3}$ the length of the second. Pectoral a little more than $\frac{1}{2}$ length of head. Anal as deep as soft dorsal; spines very feeble and closely attached to the soft rays. Ventrals separated by an interspace equal to the width of their base; spine very feeble and closely attached to the soft rays. Middle caudal rays about $\frac{2}{3}$ to $\frac{3}{5}$ length of outer. Dark olive above, mottled with brassy, which colour forms indistinct oblique lines; some specimens dark olive, dotted and

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vermiculated with yellowish; belly and lower fins pinkish; spinous dorsal greyish, or mottled with grey, and with a black blotch between the posterior rays; soft dorsal and caudal spotted with blackish or dark olive, dotted and vermiculated with yellowish; a blackish light-edged blotch usually present at base of pectoral.

Total length 700 millim. Reaches to 900 millim.

Canada and Northern United States east of the Rocky Mountains; Mississippi Valley to Louisiana.

| | | |
|---|---|---|
| *a.* Ad. | Moose Jaw, Assiniboia. | Prof. Eigenmann [C.]. |
| *b–e.* Yg. | Fort Qu'Appelle, Assiniboia. | Prof. Eigenmann [C.]. |
| *f–h.* Hgr. | Winnipeg, Manitoba. | Prof. Eigenmann [C.]. |
| *i.* Ad. | Toledo, L. Erie. | |
| *k, l.* Ad., stffd. | Albany R. | Sir J. Richardson [P.]. |
| *m, n.* Ad., skins. | Albany R. | |
| *o.* Hgr. | Ecorse, Michigan. | Smithsonian Institution |
| *p.* Hgr. | Valley Falls, Kansas. | Smithsonian Institution. |
| *q, r.* Hgr. & yg., skins. | N. America. | Parnell Collection. |
| *s.* Ad., skel. | Toledo, L. Erie. | |

### 3. PERCINA.

Etheostoma, part., *Rafin. Journ. de Phys.* lxxxviii. 1819, p. 419; *Storer, Mem. Am. Acad.* (2) ii. 1846, p. 269; *Gill, Proc. U.S. Nat. Mus.* x. 1887, p. 47; *Jordan, Man. Vert. N. U.S.* 5th ed. p. 121 (1888).

Percina, *Haldeman, Journ. Ac. Philad.* viii. 1842, p. 330; *Girard, Proc. Ac. Philad.* 1859, p. 66; *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 210; *Jord. Proc. Ac. Philad.* 1877, p. 55; *Jord. & Gilb. Syn. Fish. N. Am.* p. 499 (1882).

Pileoma, *De Kay, N. Y. Faun., Fish.* p. 16 (1842); *Agassiz, Lake Super.* pp. 299, 307 (1850); *Günth. Cat.* i. p. 76 (1859); *Vaillant, N. Arch. Mus.* ix. 1873, p. 39.

Asproperca, *Heckel, in Canestr. Verh. zool.-bot. Ges. Wien,* x. 1860, p. 311.

Ericosma, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 8.

Alvordius, *Jord. & Gilb. op. cit.* p. 500.

Body compressed; scales small, denticulated; ventral line naked or with a median series of enlarged, caducous scales. Lateral line complete; tubes straight, and occupying nearly the entire length of the scale. Mouth narrow; præmaxillaries not protractile, except at the sides; maxillary small, exposed, slipping under the præorbital; villiform teeth in jaws and on vomer, and in some species on palatines; head naked or partly scaly; præopercle entire; opercle ending in a spine. Gill-membranes separate; six branchiostegals; pseudobranchiæ small; gill-rakers short. Two dorsals, contiguous or narrowly separated, with X–XVII, 11–17 rays, the spinous longer than the soft. Anal short, with II 8–12 rays. Caudal truncate or emarginate. Pectorals symmetrical, rounded or obtusely pointed, rays 14–15. Ventrals behind the base of the pectorals, separated by an interspace nearly equal to the width of their base; spine moderate or feeble. Vertebræ 39–44 (17–23+21–23).

North America east of the Rocky Mountains.

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*Synopsis of the Species.*

I. Snout projecting considerably beyond lower jaw; maxillary extending to below posterior nostril; distance between mouth and gill-cleft (measured on the middle line) about half length of head; 80–90 scales in a longitudinal series.

Depth of body at least 5 times in total length.. 1. *caprodes*, p. 57.
Depth of body less than 5 times in total length. 2. *rex*, p. 59.

II. Snout scarcely projecting, but lower jaw included all around; maxillary extending to below anterior border of eye, or beyond; distance between mouth and gill-cleft about half length of head.

A. Snout not or but slightly longer than eye; sc. 44–80.

1. First dorsal nearly as deep as second.

Sc. 60–80 $\frac{7-9}{13-17}$; l. l. 63–75; cheeks scaly .... 3. *aspro*, p. 59.

Sc. 52–73 $\frac{7-9}{10-15}$; l. l. 52–66; cheeks naked, or with a few imbedded scales ..... 4. *peltata*, p. 60.

Sc. 56–57 $\frac{5-6}{8-10}$; l. l. 53–56; cheeks scaly..... 5. *guentheri*, p. 61.

2. First dorsal not so deep as second.

Sc. 44–50 $\frac{4-5}{7-9}$; l. l. 41–50 ..... 6. *roanoka*, p. 62.

B. Snout a little longer than eye; sc. 88–90 $\frac{9-11}{15-18}$; l. l. 74–83. 7. *macrocephala*, p. 62.

III. Lower jaw quite as long as upper; snout very narrow and pointed; maxillary extending to below anterior border of eye; distance between mouth and gill-cleft $\frac{2}{3}$ length of head.

Sc. 80–85 $\frac{10-12}{15-17}$; l. l. 66–71 ..... 8. *phoxocephala*, p. 63.

Fig. 7.—Upper view of skull of *Percina caprodes*.

## 1. Percina caprodes.

Sciæna caprodes, *Rafin. Am. Monthl. Mag.* 1818, p. 534.

Etheostoma caprodes, *Rafin. Journ. de Phys.* lxxxviii. 1819, p. 419, *and Ichth. Oh.* p. 38 (1820); *Kirtland, Bost. Journ. N. H.* iii. 1841, p. 346, pl. v. fig. 3; *Storer, Mem. Am. Ac.* (2) ii. 1846, p. 270; *Everm. & Kend. Bull. U.S. Fish Comm. f.* 1892, p. 113, pl. xxxv. (1894); *Moenkhaus, Am. Nat.* 1894, p. 641, pls. xviii. & xix.

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Perca (Percina) nebulosa, *Haldem. Journ. Ac. Philad.* viii. 1842, p. 330.
Pileoma semifasciatum, *De Kay, N. Y. Faun., Fish.* p. 16, pl. 50. fig. 162 (1842); *Günth.* i. p. 76 (1859).
Percina bimaculata, *Haldem. Proc. Bost. Soc. N. H.* i. 1844, p. 157.
Etheostoma nebulosa, *Storer, Mem. Am. Ac.* (2) ii. 1846, p. 271.
Etheostoma semifasciata, *Storer, l. c.*
Etheostoma bimaculata, *Storer, l. c.* p. 272.
Pileoma caprodes, *Agass. L. Super.* p. 308 (1850); *Vaill. N. Arch. Mus.* ix. 1873, p. 43, pls. ii. fig. 2, & iii. fig. 1.
Pileoma zebra, *Agass. l. c.* p. 308, pl. iv. fig. 4; *Vaill. l. c.* p. 48, pls. i. fig. 1, & ii. fig. 1.
Pileoma carbonaria, *Baird & Gir. Proc. Ac. Philad.* 1853, p. 387; *Günth.* i. p. 76.
Percina nebulosa, *Gir. Proc. Ac. Philad.* 1859, p. 66.
Percina caprodes, *Gir. l. c.*; *Jord. Ann. Lyc. N. Y.* xi. 1877, p. 312; *Jord. & Gilb. Syn. Fish. N. Am.* p. 499 (1882).
Percina zebra, *Gir. l. c.*
Percina carbonaria, *Gir. l. c.* p. 67.
Asproperca zebra, *Heck. in Canestr. Verh. zool.-bot. Ges. Wien*, x. 1860, p. 311.
Percina manitou, *Jord. Proc. Ac. Philad.* 1877, p. 53.

D. XIII–XVII, 12–17. A. II 9–12. Sc. 90–95 $\frac{8-10}{14-16}$; l. l. 76–93.

Depth of body 5 to 6½ times in total length, length of head 4 to 4¾ times. Snout projecting, pig-like; diameter of eye about ⅔ length of snout, ¼ length of head, and equal to interorbital width; maxillary extending to below posterior nostril; cheeks and opercles scaled; opercular spine strong; distance between mouth and gill-cleft (measured on the median line) about ½ length of head. Dorsal originating above base of ventral; spinous portion 1⅓ to 1½ as long, and not quite so deep, as the soft; first spine a little shorter than second. Pectoral as long as, or a little shorter than, the head. Anal spines feeble, subequal, or first shorter than second; soft rays as long as dorsals. Caudal truncate. Breast naked; middle ventral line naked, or with caducous enlarged scales. Olivaceous, with numerous dark bars, usually alternately long and short; dorsal and caudal fins dark-spotted or barred; a black spot at base of caudal.

Total length 145 millim.

Great Lakes District; Mississippi Valley southward to Texas; North-eastern United States.

| | | |
|---|---|---|
| *a, b.* Ad., skins. | L. Erie. | Parnell Collection. |
| *c.* Ad., skin. | Ohio Canal. | Parnell Collection. |
| *d.* Ad. | Yellow Creek, Ohio. | Smithsonian Instit. |
| *e.* Ad. | Pennsylvania. | Smithsonian Instit. |
| *f–h.* Ad. & hgr. | Gosport, Indiana. | Prof. Eigenmann [C.]. |
| *i.* Hgr. | Wabash R., New Harmony, Ind. | Prof. Eigenmann [C.]. |
| *k.* Ad. | Bean Blossom Creek, Monroe Co., Ind. | Prof. Eigenmann [C.]. |
| *l.* Ad. | Cedar Bluffs, Monroe Co., Ind. | Prof. Eigenmann [C.]. |
| *m.* Ad. | N. America. | Godeffroy Museum. |
| *n.* Ad., skel. | N. America. | Roy. Coll. of Surgeons. |

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### 2. Percina rex.

Etheostoma rex, *Jord. & Everm. Proc. U.S. Nat. Mus.* xi. 1888, p. 357, pl. xlv. fig. 9.

D. XIV, 15. A. II 11. Sc. 83-85 $\frac{11}{15}$.

Very closely allied to *P. caprodes*, from which it differs in the stouter body, the depth being contained $4\frac{3}{5}$ times in the total length; head stouter, $3\frac{5}{6}$ in total length; snout more acuminate. Mottled green above, yellowish below; four dark cross-blotches on back, and about ten roundish dark blotches on side, these almost confluent into a band; a small black spot at base of caudal; first dorsal mottled, with a median dusky band; second dorsal and caudal with oblique transverse series of black spots.

Total length 140 millim.

Roanoke River, North Carolina.

### 3. Percina aspro.

Etheostoma blennioides (*non Raf.*), *Kirtl. Bost. Journ. N. H.* iii. 1841, p. 348, pl. vi. fig. 1; *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 211; *Vaill. N. Arch. Mus.* ix. 1873, p. 57, pl. ii. fig. 5.

Alvordius maculatus (*non Gir.*), *Jord. Man. Vert. N. U.S.* 2nd ed. p. 220 (1878).

Alvordius aspro, *Cope & Jord. Proc. Ac. Philad.* 1877, p. 51; *Jord. & Gilb. Syn. Fish. N. A.* p. 501 (1882).

Hadropterus aspro, *Gilb. Proc. U.S. Nat. Mus.* vii. 1884, p. 205.

Etheostoma aspro, *Jord. Man. Vert. N. U.S.* 5th ed. p. 127 (1888), *and Bull. U.S. Fish Comm.* viii. 1889, p. 124; *Woolman, Bull. U.S. Fish Comm.* x. 1892, p. 271.

D. XII-XV, 11-13. A. II 8-10. Sc. 60-80 $\frac{7-9}{13-17}$; l. l. 63-75.

Depth of body $4\frac{1}{2}$ to 6 times in total length, length of head 4 times. Diameter of eye equal to length of snout, $\frac{1}{4}$ length of head, and greater than interorbital width; maxillary extending to below anterior fourth of eye; cheeks and opercles scaled; a strong opercular spine; distance between mouth and gill-cleft (measured on the median line) about $\frac{1}{2}$ length of head. Dorsal originating behind vertical of base of ventral; spinous portion $1\frac{1}{2}$ to $1\frac{2}{3}$ as long, and nearly as deep as the soft; first spine considerably shorter than second. Pectoral a little shorter than the head. First spine of anal as long as and stronger than second; soft rays a little longer than dorsals. Caudal feebly emarginate. Breast naked; middle ventral line naked, or with caducous enlarged scales. Yellow or greenish above, with darker marblings; a series of six or seven large blackish blotches on each side, which may be entirely or partly confluent into a lateral stripe; usually a vertical black streak below the eye; dorsal and caudal, and sometimes also the other fins, more or less distinctly barred with blackish; anterior and posterior portions of spinous dorsal sometimes black.

Total length 80 millim.

Ohio River to Upper Missouri.

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| | | |
|---|---|---|
| *a.* Ad. | Bloomington, Indiana. | Prof. D. S. Jordan [C.]. |
| *b.* Ad. | White R., Indiana. | Prof. D. S. Jordan [C.]. |
| *c–f.* Ad. | Yellow R., Plymouth, Ind. | U.S. Fish Commission. |
| *g.* Hgr. | Big Creek, Mt. Vernon, Ind. | U.S. Fish Commission. |
| *h, i.* Ad. | Bean Blossom Creek, Monroe Co., Ind. | Prof. Eigenmann [C.]. |
| *k–l.* Ad. | Cedar Bluffs, Monroe Co., Ind. | Prof. Eigenmann [C.]. |
| *m–n.* Hgr. | Red Lake R., Crookston, Minn. | Prof. Eigenmann [C.]. |
| *o.* Hgr. | Goose R., Hillsboro', N. Dacota. | Prof. Eigenmann [C.]. |

### 4. Percina peltata.

Hadropterus maculatus, *Gir. Proc. Ac. Philad.* 1859, p. 100 (*nec* Alvordius maculatus, *Gir.*).
Etheostoma peltatum, *Cope, Proc. Ac. Philad.* 1864, p. 233; *Vaill. N. Arch. Mus.* ix. 1873, p. 61, pl. ii. fig. 3; *Jord. Bull. U.S. Fish Comm.* viii. 1889, p. 113.
Etheostoma maculatum, *Cope, Proc. Am. Philos. Soc.* xi. 1870, p. 261.
Etheostoma nevisense, *Cope, l. c.*
Alvordius evides, *Jord. & Copel. Proc. Ac. Philad.* 1877, p. 51; *Jord. & Gilb. Syn. Fish. N. Am.* p. 503 (1882).
Ericosma evides, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 8.
Alvordius peltatus, *Jord. Man. Vert. N.U.S.* 2nd ed. p. 220 (1878).
Alvordius crassus, *Jord. & Brayt. Bull. U.S. Nat. Mus.* no. 12, 1878, p. 12; *Jord. & Gilb. l. c.* p. 503.
Alvordius variatus (*non Kirtl.*), *Jord. & Gilb. l. c.*
Alvordius nevisensis, *Jord. & Gilb. l. c.* p. 502.
Hadropterus peltatus, *Jord. Rep. U.S. Fish Comm.* 1885, p. 867.
Hadropterus evides, *Jord. l. c.*
Etheostoma (Hadropterus) ouachitæ, *Jord. & Gilb. Proc. U.S. Nat. Mus.* x. 1887, p. 49; *Jord. Bull. U.S. Fish Comm.* viii. 1889, p. 113; *Woolman, op. cit.* x. 1892, p. 254.
Etheostoma evides, *Jord. Proc. U.S. Nat. Mus.* xi. 1888, p. 359, *and Bull. U.S. Fish Comm.* viii. 1889, p. 153; *Woolman, l. c.* p. 260.
Etheostoma aspro (*non Cope*), *Eigenm. Bull. U.S. Fish Comm. f.* 1894, p. 117 (1894).

D. X–XIII, 10–14. A. II 8–10. Sc. 52–73 $\frac{7-9}{10-15}$; l. l. 52–66.

Depth of body 5 to 6 times in total length, length of head $3\frac{3}{4}$ to 4 times. Diameter of eye equal to or a little greater than length of snout, $\frac{3}{4}$ to $\frac{1}{1}$ length of head, and much greater than interorbital width; maxillary extending to below anterior third of eye or a little beyond; cheeks naked or with a few scales; opercles scaly, with a strong spine; distance between mouth and gill-cleft (measured on the median line) nearly half length of head. Dorsal originating behind vertical of base of ventral; spinous portion $1\frac{1}{2}$ to $1\frac{2}{3}$ as long, and nearly as deep as the soft. Pectoral nearly as long as head. Anal spines subequal; soft rays longer than dorsals. Caudal emarginate. Breast naked; ventral line with enlarged caducous scales. Yellowish brown or olive above, the back crossed by brown bars; a lateral series of large squarish brown blotches or vertical bars, which may be confluent into a lateral stripe; a black spot at

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base of caudal; a black streak on each side of the snout and a more or less distinct vertical streak below the eye; dorsal and caudal fins with or without blackish bars.

Total length 65 millim.

North America, from Manitoba, Indiana, Ohio, and Pennsylvania to South Carolina and Arkansas.

| | | |
|---|---|---|
| *a*. Hgr. | Blackwater R., Zuni, Virginia. | Prof. Eigenmann. |
| *b*. Hgr. | Neuse R., Raleigh, N. Carolina. | U.S. Fish Commission. |
| *c–e*. Ad. | White R., Indiana. | Prof. D. S. Jordan [C.]. |
| *f*. Ad. | White R., Ind. | Smithsonian Instit. |
| *g–k*. Ad. & hgr. | Tippecanoe R., Marshland, Ind. | Prof. Eigenmann [C.]. |
| *l*. Ad. | Wabash R., Vincennes, Ind. | Prof. Eigenmann [C.]. |
| *m*. Many specs. | Gosport, Monroe Co., Ind. | Prof. Eigenmann [C.]. |
| *n*. Several specs., ad. & yg. | Brandon, Manitoba. | Prof. Eigenmann [C.]. |
| *o–r*. Hgr. & yg. | Winnipeg, Manitoba. | Prof. Eigenmann [C.]. |

The latter specimens (*n*, *o–r*) have been referred by Prof. Eigenmann to *P. aspro*, from which they differ in the naked cheek (with or without a few imbedded scales) and the smaller number of scales in the lateral line. They show the following formula:—D. XIII, 12–14; A. II 9–10; Sc. 64–72 $\frac{7}{12-14}$; l. l. 56–62. In the Bull. U.S. Fish Comm. viii. 1889, p. 113, Prof. Jordan says of *P. peltata*:—"General form of *E. aspro*, from which this species scarcely differs except in the larger size of its scales." If so, the Canadian specimens belong to *P. peltata* and not to *P. aspro*. The two species are, however, nearly completely connected, and may ultimately have to be united.

### 5. Percina guentheri.

Etheostoma güntheri, *Eigenmann*, *Am. Nat.* 1892, p. 962, *and Bull. U.S. Fish Comm. f.* 1894, p. 116 (1894).

D. X, 13–14. A. II 10–11. Sc. 56–57 $\frac{5-6}{8-10}$; l. l. 53–56.

Depth of body 5⅔ to 6 times in total length, head 3¼ to 4 times. Diameter of eye equal to length of snout, ¼ length of head, and greater than interorbital width; maxillary extending to below anterior fourth of eye; cheeks and opercles scaled; a strong opercular spine; distance between mouth and gill-cleft (measured on the median line) half length of head. Dorsal originating behind vertical of base of ventrals; spinous portion 1½ as long and nearly as deep as the soft; first spine considerably shorter than second. Pectoral nearly as long as the head. First spine of anal as long as and stronger than second; soft rays about as long as dorsals.

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Caudal feebly emarginate. Nape and breast naked. Yellowish, back marbled with darker; a lateral series of large dark spots; a dark streak in front of, and another below the eye; spinous dorsal with a black spot in front and another behind.

Total length 60 millim.

Western Canada and Iowa.

| | | |
|---|---|---|
| *a–c.* Ad. & hgr. | Winnipeg, Manitoba. | Prof. Eigenmann [C.]. (Types.) |

### 6. Percina roanoka.

Etheostoma roanoka, *Jord. Proc. U.S. Nat. Mus.* xi. 1889, p. 358, pl. xlv. fig. 10.

D. X–XII, 11. A. II 8–9. Sc. 44–50 $\frac{4-5}{7-9}$; l. l. 41–50.

Depth of body 4⅓ to 5 times in total length, length of head 3½ to 4 times. Diameter of eye equal to or a little longer than the snout, about ¼ length of head, and greater than interorbital width; maxillary extending to below anterior fourth or anterior third of eye; head entirely naked, or with a few scales on the opercle; a strong opercular spine; distance between mouth and gill-cleft (measured on the median line) half length of head. Dorsal originating just behind vertical of base of ventral; spinous portion 1½ as long, and not so deep as the soft; first spine a little shorter than second. Pectoral as long as head. Anal spines subequal; soft rays as long as dorsals. Caudal feebly emarginate. Breast naked; middle ventral line naked, or with caducous enlarged scales. Yellowish, males dark green; sides with 10 or 11 vertical dark bars, more or less confluent into a lateral band; these bars deep blue-green and vaguely defined in males; a black streak on each side of the snout, and a more or less distinct vertical streak below the eye; dorsal and caudal fins with dark bars; fins blue-black in males, first dorsal with a yellow median band.

Total length 450 millim.

Virginia and North Carolina.

| | | |
|---|---|---|
| *a–c.* Ad. & yg. | Roanoke R., Virginia. | U.S. Fish Commission. |
| *d.* Ad. | Neuse R., Raleigh, N. Carolina. | U.S. Fish Commission. |

### 7. Percina macrocephala.

Etheostoma macrocephala, *Cope, Tr. Am. Philos. Soc.* (2) xiii. 1869, p. 400; *Vaill. N. Arch. Mus.* ix. 1873, p. 64, pl. ii. fig. 4; *Jord. Bull. U.S. Fish Comm.* viii. 1889, p. 147; *Woolman, op. cit.* x. 1892, p. 259.

Alvordius macrocephalus, *Jord. Ann. N. Y. Ac.* i. 1877, p. 96, *and Man. Vert. N. U.S.* 2nd ed. p. 220 (1878); *Jord. & Gilb. Syn. Fish. N. A.* p. 501 (1882).

Hadropterus macrocephalus, *Jord. Rep. U.S. Fish Comm.* 1885, p. 867.

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D. XII–XVI, 12–14. A. II 9–11. Sc. 88–90 $\frac{9\text{-}11}{15\text{-}18}$; l. l. 74–83.

Depth of body 6 to 6½ times in total length, length of head 3½ to 4 times. Diameter of eye a little less than length of snout, ⅔ length of head, and greater than interorbital width; maxillary extending to below anterior border of eye or a little beyond; head entirely naked or opercles with a few scales; opercular spine strong; distance between mouth and gill-cleft (measured on the median line) a little more than half length of head. Dorsal originating behind vertical of base of ventrals; spinous portion 1½ as long and nearly as deep as the soft; first spine a little shorter than second. Pectoral ⅚ length of head. Anal spines subequal; soft rays as long as dorsals. Caudal emarginate. Breast naked; ventral line with enlarged caducous scales. Light brown, with a whitish lateral band and a series of dark spots which may be confluent into a band; a black spot at base of caudal; a dark streak below the eye (sometimes absent); vertical fins somewhat barred; spinous dorsal with a median blackish band.

Total length 80 millim.

Ohio Valley.

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| *a*. Ad. | Foxburg, Pennsylvania. | U.S. Fish Commission. |
| *b*. Ad. | Green R., Bowling Green, Kentucky. | A. J. Woolman, Esq. [C.]. |

### 8. Percina phoxocephala.

Etheostoma phoxocephalus, *Nelson, Bull. Illin. Mus. N. H.* i. 1876, p. 35.

Alvordius phoxocephalus, *Cope & Jord. Proc. Ac. Philad.* 1877, p. 50; *Jord. & Gilb. Syn. Fish. N. A.* p. 501 (1882).

Hadropterus phoxocephalus, *Gilb. Proc. U.S. Nat. Mus.* vii. 1884, p. 205.

D. XI–XII, 12–14. A. II 8–9. Sc. 80–85 $\frac{10\text{-}12}{15\text{-}17}$; l. l. 66–71.

Depth of body 5½ to 6 times in total length, length of head 3⅔ to 4 times. Snout very narrow and pointed, not at all projecting beyond the lower jaw; diameter of eye equal to length of snout, ¼ length of head, and greater than interorbital width; maxillary extending to below anterior border of eye; cheeks and opercles scaled; a strong opercular spine; distance between mouth and gill-cleft (measured on the median line) ⅔ length of head. Dorsal originating just behind vertical of ventral; spinous portion about 1½ as long, and not quite so deep, as the soft; first spine considerably shorter than second, middle longest. Pectoral shorter than head. Anal spines subequal; soft rays a little longer than dorsals. Caudal feebly emarginate. Breast naked; middle ventral line with enlarged scales. Yellowish brown above, spotted or marbled with dark brown; a lateral series of 12 or 13 dark brown blotches; a small black spot at base of caudal; a black streak on each side of the snout; dorsals and caudal with dark bars or series of spots.

Total length 57 millim.

Indiana to Kansas.

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| *a–b*. Ad. & hgr. | Gosport, Monroe Co., Indiana. | Prof. Eigenmann [C.]. |
| *c*. Ad. | Wabash R., Terre Haute, Indiana. | U.S. Fish Commission. |

## 4. ETHEOSTOMA.

Etheostoma, part., *Rafin. Journ. de Phys.* lxxxviii. 1819, p. 419; *Vaill. N. Arch. Mus.* ix. 1873, p. 52; *Gilbert, Proc. U.S. Nat. Mus.* x. 1887, p. 47; *Jordan, Man. Vert. N. U.S.* 5th ed. p. 121 (1888).
Aplesion, part., *Rafin. Ichth. Oh.* p. 35 (1820).
Pœcilosoma (*non Hübner*), *Agass. Lake Super.* p. 299 (1850).
Catonotus, *Agass. Am. Journ. Sc.* (2) xvii. 1854, p. 305; *Vaill. l. c.* p. 117.
Hadropterus, *Agass. l. c.*; *Jord. & Gilb. Syn. Fish. N. A.* p. 505 (1882).
Pœcilichthys, *Agass. l. c.*; *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 210; *Jord. & Gilb. l. c.* p. 514.
Oligocephalus, *Girard, Proc. Ac. Philad.* 1859, p. 67.
Alvordius, *Gir. l. c.* p. 68; *Jord. & Gilb. l. c.* p. 500.
Alvarius, *Gir. l. c.* p. 101.
Boleichthys, *Gir. l. c.* p. 103.
Boleosoma, part., *Günth. Cat.* i. p. 77 (1859); *Vaill. l. c.* p. 73.
Nothonotus, *Agass. in Putnam, Bull. Mus. Comp. Zool.* i. 1863, p. 3; *Jord. & Gilb. l. c.* p. 506.
Microperca, *Putnam, l. c.* p. 4; *Jord. & Gilb. l. c.* p. 522.
Hololepis, *Agass. l. c.*; *Vaill. l. c.* p. 126.
Cottogaster (*non Putnam*), *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 210.
Hypohomus, *Cope, Proc. Am. Philos. Soc.* xi. 1870, p. 449.
Plesioperca, *Vaill. l. c.* p. 36.
Astatichthys, *Vaill. l. c.* p. 106.
Nanostoma (*non Günth.*), *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 6; *Jord. & Gilb. l. c.* p. 509.
Etheostoma, *Jord. & Gilb. l. c.* p. 512.
Serraria, *Gilb. Proc. U.S. Nat. Mus.* vii. 1884, p. 205.
Rhothoeca, *Jord. Rep. U.S. Fish. Comm.* 1885, p. 868.

Body compressed; scales small, denticulated; lateral line present or absent, the tube straight and extending nearly to the extremity of the scale. Mouth moderate or narrow; præmaxillaries not protractile, except at the sides; maxillary small, exposed, slipping under the præorbital; villiform teeth in jaws and usually on vomer and palatines. Head naked or partly scaly; præopercle entire or finely serrated on its posterior border; opercle ending in a spine; gill-membranes separate or more or less broadly united across isthmus; six branchiostegals; pseudobranchiæ small or rudimentary; gill-rakers short. Two dorsals, contiguous or separated, with VI–XV, 8–15 rays. Anal short, with I–II 6–12 rays. Caudal truncate, emarginate, or rounded. Pectorals symmetrical, rounded, with 11–15 rays. Ventrals below or behind the base of the pectorals, narrowly separated from each other; spine moderate or feeble. Vertebræ 30–38 (13–18+16–24).

North America east of the Rocky Mountains, from Canada to North Mexico.

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*Synopsis of the Species.*

I. Two anal spines.

A. Gill-membranes not or but scarcely united across the isthmus, the distance between the mouth and the gill-cleft (measured on the middle line) about half or three-fifths length of head.

1. Lateral line complete or nearly so; spinous dorsal considerably longer than the second.

*a.* No black humeral scale.

*a.* Anal II 10–12; lat. l. 58–85.

D. XV, 15; sc. 85 $\frac{15}{25}$; opercles and breast scaly ..... 1. *aurantiacum*, p. 67.

D. XII–XIV, 12–13; sc. 64–70 $\frac{7}{12-13}$; opercles and breast scaly ..... 2. *cymatotænia*, p. 67.

D. XI–XII, 13–14; sc. 58–74 $\frac{11}{16}$; opercles and breast naked ..... 3. *nianguæ*, p. 68.

*β.* Anal II 7–9; lat. l. 43–63.

* Head rather long and pointed, the snout not decurved; D. X–XII, 11–13.

Sc. 56–63 $\frac{8-9}{14}$ ..... 4. *maculatum*, p. 68.

Sc. 45–48 $\frac{6}{10}$ ..... 5. *rufolineatum*, p. 69.

** Snout very short and abruptly decurved; D. X–XIV 12–14; sc. 50–58 $\frac{7-8}{-}$ ..... 6. *camurum*, p. 69.

*b.* An enlarged, black humeral scale; D. X–XI, 10–12; A. II 7–8; sc. 43–55 $\frac{5-6}{10}$ ..... 7. *jordani*, p. 70.

2. Lateral line incomplete.

*a.* No black humeral scale.

*a.* Lateral line nearly straight, not arched above pectoral.

* 4 to 7 scales between spinous dorsal and lateral line.

† At least a few scales on the opercles or on the cheeks.

D. IX–XII, 12–14; sc. 37–50 $\frac{5-6}{-}$; opercles with a few scales, cheeks naked or nearly so. 8. *cæruleum*, p. 71.

D. X, 12; sc. 54–61 $\frac{7}{-}$; opercles naked, cheeks densely scaled ..... 9. *lepidogenys*, p. 72.

D. XI–XII, 12; sc. 41–55 $\frac{4-6}{-}$; cheeks and opercles scaled ..... 10. *jessiæ*, p. 72.

D. VIII–X, 10–11; sc. 55–63 $\frac{4-5}{-}$ ..... 11. *ioæ*, p. 72.

D. IX–X, 13; sc. 49–55 $\frac{6}{-}$; caudal peduncle slender ..... 12. *luteovinctum*, p. 73.

†† Head entirely naked; D. IX–XI, 10–13.

Sc. 48–54 $\frac{6-7}{-}$ ..... 13. *lepidum*, p. 73.

Sc. 44–50 $\frac{5}{-}$ ..... 14. *pottsii*, p. 74.



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** 2 to 4 scales between spinous dorsal and lateral line; D. IX–XII, 9–12.

Sc. 53 $\frac{3-4}{10}$; l. l. 19 ..... 15. *quappellæ*, p. 74.

Sc. 48–56 $\frac{2-3}{10}$; l. l. 21–28 ..... 16. *quiescens*, p. 75.

β. Lateral line forming a slight curve above pectoral; D. VII–X, 9–12; sc. 43–58 $\frac{3-4}{12}$.

Cheeks scaly ..... 17. *fusiforme*, p. 75.
Cheeks naked ..... 18. *exile*, p. 76.

b. An enlarged, black humeral scale.

a. D. VIII–X, 9–13; sc. 45–55.

* Opercles naked or with a few scales.

Sc. 53; anal with 8 soft rays ..... 19. *virgatum*, p. 77.

Sc. 46–55 $\frac{6-7}{\quad}$; maxillary extending to below anterior third of eye ..... 20. *cragini*, p. 77.

Sc. 45–50 $\frac{5-6}{\quad}$; maxillary extending to below centre of eye ..... 21. *obeyense*, p. 78.

** Cheeks and opercles scaly; sc. 53 $\frac{4}{10}$. 22. *boreale*, p. 78.

β. D. IX–X, 12–13; sc. 56–61 $\frac{8}{13}$ .. 23. *pagii*, p. 79.

γ. D. X–XII, 12–14.

D. X–XI, 14; sc. 63–80; opercles naked.... 24. *punctulatum*, p. 79.
D. XII, 12; sc. 50; opercles scaly ..... 25. *tippecanoe*, p. 79.

B. Gill-membranes more or less broadly united across isthmus.

1. Lateral line complete or nearly so.

a. No black humeral scale.

a. D. XI–XIV, 11–14, spinous portion longer than the soft; A. II 9–10.

* Cheeks and opercles scaly; diameter of eye nearly equal to interorbital width.

Sc. 55–65 $\frac{6-7}{\quad}$..... 26. *nigrofasciatum*, p. 80.

Sc. 68–70 $\frac{7-8}{\quad}$..... 27. *scierum*, p. 80.

** Head almost naked; sc. 48–63 $\frac{6-8}{\quad}$.

Pectoral as long as head; anal nearly as long as soft dorsal ..... 28. *variatum*, p. 81.
Pectoral considerably longer than head; anal considerably shorter than soft dorsal .... 29. *swannanoa*, p. 81.

β. D. IX–XII, 10–13; A. II 6–8.

Sc. 57–60; spinous and soft dorsals equal in length; opercles scaly..... 30. *cinereum*, p. 82.

Sc. 50–57 $\frac{6-7}{\quad}$; cheeks naked; opercles scaly . 31. *rupestre*, p. 82.

Sc. 42–53 $\frac{5-6}{\quad}$; cheeks and opercles scaly .... 32. *zonale*, p. 83.

Sc. 40–48 $\frac{5}{\quad}$; head entirely naked ..... 33. *thalassinum*, p. 83.

b. An enlarged, black humeral scale; D. XIV, 13; A. II 10; sc. 82 $\frac{10}{18}$ .. 34. *squamatum*, p. 84.

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2. Lateral line incomplete; an enlarged, black humeral scale.
Sc. 50–70 $\frac{7-9}{20}$; l. l. 40–50 ..... 35. *whipplii*, p. 84.
Sc. 48–60 $\frac{5-6}{13}$; l. l. 48–60 ..... 36. *squamiceps*, p. 85.
Sc. 40–66 $\frac{7-9}{14-20}$; l. l. 15–40; lower jaw projecting ..... 37. *flabellare*, p. 86.
3. Lateral line absent..... 38. *microperca*, p. 87.

II. A single anal spine.
A. Lateral line nearly complete, on 50 scales or more; A. I 7.
D. XI, 11–12 ..... 39. *juliæ*, p. 87.
D. VI, 10 ..... 40. *laterale*, p. 87.

B. Lateral line incomplete, on 15–50 scales; D. IX–XII.
A. I 10; sc. 68; cheeks and opercles naked . 41. *sagitta*, p. 88.
A. I 7–8; sc. 58–66; cheeks and opercles naked ..... 42. *australe*, p. 88.
A. I 8; sc. 48–50; cheeks and opercles scaly. 43. *tuscumbia*, p. 89.

C. Lateral line absent, or extending on one or two scales only; sc. 34–36; A. I 6–7.
D. VIII, 11; snout longer than eye ..... 44. *præliare*, p. 89.
D. VI–VII, 8–10; snout not longer than eye. 45. *fonticola*, p. 90.

### 1. Etheostoma aurantiacum.

Cottogaster aurantiacus, *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 211, pl. xxiv. fig. 6.
Hypohomus aurantiacus, *Cope, Proc. Am. Philos Soc.* xi. 1870, p. 449.
Etheostoma aurantiacum, *Vaill. N. Arch. Mus.* ix. 1873, p. 67; *Jord. Bull. U.S. Fish Comm.* viii. 1889, p. 147.
Hadropterus aurantiacus, *Jord. Man. Vert. N. U.S.* p. 221 (1876); *Jord. & Gilb. Syn. Fish. N. A.* p. 505 (1882).

D. XV, 15. A. II 11. Sc. 85 $\frac{15}{25}$.

Depth of body 6 times in total length, length of head 4 times. Snout slightly longer than eye, which is $\frac{1}{4}$ length of head; maxillary reaching to below anterior border of eye; cheeks and opercles scaly; gill-membranes separate. Spinous portion of dorsal as deep, and $1\frac{1}{2}$ as long as soft; first spine much shorter than second. Pectoral a little shorter than head. Anal as deep as soft dorsal; spines subequal. Caudal truncate. Breast and belly scaly. Bright yellow, with a black lateral band and a few brown spots on each side of the dorsal fin; fins immaculate.
Total length 120 millim.
Headwaters of Tennessee River.

### 2. Etheostoma cymatotænia.

Etheostoma (Hadropterus) cymatotænia, *Gilb. & Meek, Proc. U.S. Nat. Mus.* x. 1887, p. 51; *Woolman, Bull. U.S. Fish Comm.* x. 1892, p. 260.

D. XII–XIV, 12–13. A. II 10. Sc. 64–70 $\frac{7}{12-13}$; l. l. 60–63.

Depth of body 5 to $5\frac{1}{2}$ times in total length, length of head 4 times.



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Diameter of eye greater than length of snout, nearly $\frac{1}{4}$ length of head; jaws equal; maxillary reaching to below anterior border of eye; cheeks and opercles scaly; opercular spine strong; gill-membranes separate. Spinous portion of dorsal as deep and nearly twice as long as the soft. Pectoral shorter than head. First spine of anal long and strong. Breast and belly scaly. Greenish, with fine dark points; two pale streaks along side, bordering a broad dark wavy band; a small black spot at base of caudal; fins with dark lines.

Total length 50 millim. Grows to 100 millim.

Missouri and Kentucky.

*a*. Hgr. Green R., Greensburg, Kentucky. A. J. Woolman, Esq. [C.].

### 3. Etheostoma nianguæ.

Etheostoma (Hadropterus) nianguæ, *Gilb. & Meek, Proc. U.S. Nat. Mus.* x. 1887, p. 52.

Etheostoma nianguæ spilotum, *Gilb. & Meek, l. c.* p. 53.

Etheostoma spilotum, *Woolman, Bull. U.S. Fish Comm.* x. 1892, p. 280, pl. li. fig. 3.

D. X–XII, 13–14. A. II 10–12. Sc. 58–74 $\frac{11}{16}$.

Depth of body 5 to 6 times in total length, length of head $3\frac{2}{3}$ to $3\frac{4}{5}$ times. Snout deep and narrow, longer than eye; diameter of eye 5 to $5\frac{1}{2}$ times in length of head; maxillary reaching beyond vertical of anterior border of eye; cheeks with a few rudimentary scales; opercles naked; gill-membranes separate. Spinous portion of dorsal longer than the soft. Anal rather smaller than second dorsal; first spine shorter than second. Lateral line sometimes incomplete; breast naked; belly scaled. Olivaceous, the back with 8 to 10 wide dusky cross-bars, which extend on the sides; in the male the dark bands encircle the body, which bears carmine-red spots in the pale interspaces; two black spots at base of caudal; first dorsal dusky, spotted with red and with red edge; other fins mostly mottled with red.

Total length 95 millim.

Niangua River, Southern Missouri, and Kentucky River.

### 4. Etheostoma maculatum.

Etheostoma maculata, *Kirtland, Bost. Journ. N. H.* iii. 1840, p. 276, pl. ii. fig. 3; *Jord. Man. Vert. N. U.S.* 5th ed. p. 130 (1888), *and Bull. U.S. Fish Comm.* viii. 1889, p. 160.

Nothonotus maculatus, *Agass. in Putn. Bull. Mus. Comp. Zool.* i. 1863, p. 3; *Jord. Man. Vert. N. U.S.* p. 225 (1876); *Jord. & Gilb. Syn. Fish. N. A.* p. 508 (1882).

Pœcilichthys sanguifluus, *Cope, Proc. Am. Philos. Soc.* xi. 1870, p. 264.

Boleosoma maculatum, *Vaill. N. Arch. Mus.* ix. 1873, p. 87.

Nothonotus sanguifluus, *Jord. Man.* p. 226; *Jord. & Gilb. l. c.* p. 507.

D. XII, 12–13. A. II 8–9. Sc. 56–63 $\frac{8-9}{14}$; l. l. 57.

Depth of body $4\frac{2}{5}$ to $5\frac{1}{4}$ times in total length, length of head $3\frac{2}{3}$ to

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4 times. Diameter of eye about equal to length of snout, 4 to 4½ times in length of head; jaws equal; maxillary extending to below anterior third of eye; cheeks naked; opercles scaly; opercular spine strong; distance between mouth and gill-cleft (measured on the median line) ⅔ length of head. Dorsal originating above base of ventrals; spinous portion as deep and 1⅔ to 2 times as long as the soft. Pectoral shorter than head. Anal as deep as dorsal; first spine stronger and a little longer than second. Caudal rounded. Olive or blackish above, sides with crimson spots; vertical fins more or less barred with red and white; females of dull coloration, with the fins black-dotted and without red.

Total length 60 millim.

Western Pennsylvania to Eastern Tennessee.

*a*. Ad. Yellow Creek, Ohio. Smithsonian Instit.

### 5. Etheostoma rufolineatum.

Pœcilichthys rufilineatus, *Cope, Proc. Am. Philos. Soc.* xi. 1870, p. 267.

Nothonotus rufilineatus, *Jord. & Gilb. Syn. Fish. N. A.* p. 508 (1882).

Etheostoma rufolineatum, *Jord. Rep. U.S. Fish Comm.* 1885, p. 868, *and Bull. U.S. Fish Comm.* viii. 1889, p. 149; *Woolman, Bull. U.S. Fish Comm.* x. 1892, p. 260.

D. X–XII, 11–13. A. II 8–9. Sc. 45–48 $\frac{6}{10}$.

Depth of body 4½ to 5 times in total length, length of head 4 times. Snout narrow, pointed; diameter of eye about equal to length of snout, much greater than interorbital width, 4½ times in length of head; cheeks naked, opercles scaly; gill-membranes scarcely united. Spinous portion of dorsal longer than the soft. Pectoral as long as head. Caudal truncate. Lateral line complete. Male olive or green, with numerous narrow longitudinal streaks, including irregular quadrate spots of brick-red; breast blue; belly orange; head with two brown bands, and five red spots on each side; fins all broadly bordered with crimson or orange; two orange spots at base of caudal; anal scarlet-yellow at base, edge black; female olivaceous, barred, with all the fins speckled.

Total length 75 millim.

French Broad River and Holston River, North Carolina; Upper Creek River, Kentucky.

*a*. Hgr. Spring Creek, Hot Springs, North Carolina. U.S. Fish Commission.

### 6. Etheostoma camurum.

Pœcilichthys camurus, *Cope, Proc. Am. Philos. Soc.* xi. 1870, p. 265.

? Pœcilichthys vulneratus, *Cope, l. c.* p. 266.

Nothonotus camurus, *Jord. Man. Vert. N. U.S.* 2nd ed. p. 225 (1878); *Jord. & Gilb. Syn. Fish. N. A.* p. 506 (1882).

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? Nothonotus vulneratus, *Jord. & Gilb. l. c.* p. 508.

Etheostoma camurum, *Jord. Rep. U.S. Fish Comm.* 1885, p. 868, *Man. Vert. N. U.S.* 5th ed. p. 130 (1888), *Bull. U.S. Fish Comm.* viii. 1889, pp. 153 & 160, *and Proc. U.S. Nat. Mus.* xiii. 1890, p. 3, fig.; *Woolman, Bull. U.S. Fish Comm.* x. 1892, p. 260.

? Etheostoma vulneratum, *Jord. Man.* 5th ed. p. 131.

D. X–XIV, 12–14. A. II 8–9. Sc. 50–58 $\frac{7-8}{-}$.

Depth of body 4½ times in total length, length of head 4 times. Diameter of eye equal to length of snout, 4 times in length of head; mouth somewhat inferior, lower jaw included; maxillary reaching to below anterior third of eye; gill-membranes scarcely connected. Spinous portion of dorsal nearly as deep as and longer than the soft. Caudal truncate or rounded. Lateral line complete. Males blackish olive, breast and throat deep blue; sides with crimson dots; first dorsal with a black spot in front, above and behind which is a crimson one; second dorsal, anal, and caudal crimson, bordered with yellow and then with blue-black; pectorals and ventrals crimson-edged; females greenish, faintly barred.

Total length 60 millim.

From Indiana to Tennessee.

### 7. Etheostoma jordani.

Etheostoma (Nothonotus) jordani, *Gilb. Bull. U.S. Fish Comm.* ix. 1891, p. 156, pl. xliii. fig. 2.

D. X–XI, 10–12. A. II 7–8. Sc. 43–55 $\frac{5-6}{10}$.

Depth of body 4 to 4¾ times in total length, length of head 3½ to 3¾ times. Snout short, convexly decurved; diameter of eye equal to length of snout, 4 to 4½ times in length of head, twice interorbital width; mouth terminal, oblique, rather small; maxillary reaching to below anterior border or anterior fourth of eye; opercles with a few scales, head otherwise naked; gill-membranes not united. The two portions of the dorsal nearly in contact, the spinous 1½ as long as and a little deeper than the soft. Anal shorter than soft dorsal; first spine longer and stronger than second. Pectoral nearly as long as head. Caudal rounded. Scales large; lateral line complete; breast naked. Males olivaceous, with eight more or less distinct cross-bars; basal half of anterior portion of spinous dorsal black; soft dorsal and caudal with a wide white (orange ?) submarginal band, the tips narrowly black; a small black spot behind eye; females mottled, fins barred; a large black humeral scale.

Total length 45 millim.

Alabama.

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| *a–b.* Ad. & hgr. | Chocolo Creek, Oxford, Alabama. | Prof. Eigenmann. (Two of the types.) |

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### 8. Etheostoma cæruleum.

Etheostoma cærulea, *Storer, Proc. Bost. Soc. N. H.* ii. 1845, p. 47; *Jord. Man. Vert. N. U.S.* 5th ed. p. 133 (1888); *Meek, Bull. U.S. Fish Comm.* ix. 1891, pp. 119, 131, & 135.
Pœcilichthys spectabilis, *Agass. Am. Journ. Sc.* (2) xvii. 1854, p. 304; *Jord. Man. Vert. N. U.S.* 2nd ed. p. 227 (1878); *Jord. & Gilb. Syn. Fish. N. A.* p. 518 (1882).
Pœcilichthys cæruleus, *Agass. in Putn. Bull. Mus. Comp. Zool.* i. 1863, p. 3; *Jord. & Gilb. l. c.* p. 517.
Astatichthys cæruleus, *Vaill. N. Arch. Mus.* ix. 1873, p. 107, pl. iii. fig. 5.
Astatichthys pulchellus, *Vaill. l. c.* p. 113, pl. iii. fig. 6.
Pœcilichthys variatus (*non Kirtl.*), *Jord. Proc. Ac. Philad.* 1877, p. 48.

D. IX–XII, 12–14. A. II 7–8. Sc. 37–50 $\frac{5-6}{9-11}$; l. l. 18–35.

Depth of body 4 to 5 times in total length, length of head $3\frac{1}{2}$ to $3\frac{3}{4}$ times. Diameter of eye equal to or a little less than length of snout, greater than interorbital width, 4 to $4\frac{1}{2}$ times in length of head; lower jaw a little shorter than upper; maxillary extending to below anterior border of eye, or a little beyond; cheeks naked or with a few scales; opercles with a few scales; opercular spine moderate; distance between mouth and gill-cleft (measured on the median line) $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Dorsal originating just behind base of ventrals; spinous portion $1\frac{1}{3}$ to $1\frac{1}{2}$ as long, and about $\frac{2}{3}$ as deep as the soft. Pectoral nearly or quite as long as head. Anal as deep as soft dorsal; spines subequal, or first a little longer than second. Caudal rounded. Breast naked. Olivaceous, with more or less distinct dark blotches or interrupted longitudinal lines and vertical bars on the sides; these bars blue in the males; fins of males deep blue, dorsal with an orange band; fins of females with dark bars; a more or less distinct dark streak on each side of the head, passing through the eye, and sometimes a vertical one below the eye.

Total length 65 millim.

Mississippi and Ohio Basins.

| | | |
|---|---|---|
| *a, b.* Several specs., ad. | White R., Indiana. | Prof. D. S. Jordan. |
| *c–d.* Ad. | White R. | Smithsonian Inst. |
| *e–f.* Ad. | La Porte, Indiana. | Prof. D. S. Jordan. |
| *g.* Several specs., ad. & hgr. | Gosport, Indiana. | Prof. Eigenmann[C.]. |
| *h.* Several specs., ad. & hgr. | Cedar Bluffs, Monroe Co., Ind. | Prof. Eigenmann[C.]. |
| *i–k.* Ad. | Deer Creek, Camden, Ind. | Prof. Eigenmann[C.]. |
| *l–n.* Hgr. | St. Joseph R., Mishawaka, Ind. | U.S. Fish Commission. |
| *o–r.* Hgr. | Wabash R., Terre Haute, Ind. | U.S. Fish Commission. |
| *s–v, w–β.* Ad. & hgr. | Indiana. | Paris Museum. |
| *γ–δ, ε–ζ.* Ad. | Marshfield, Missouri. | Prof. Eigenmann. |

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### 9. Etheostoma lepidogenys.

Etheostoma lepidogenys, *Everm. & Kend. Bull. U.S. Fish Comm. f.* 1892, p. 114, pl. xxxv. (1894).

D. X, 12. A. II 7–8. Sc. 54–61 $\frac{7}{9}$; l. l. 32–38.

Depth of body 5 times in total length, length of head nearly 4 times. Diameter of eye nearly equal to length of snout, 4 times in length of head; lower jaw slightly included; maxillary extending to below anterior border of eye; cheeks densely scaled, opercles naked; gill-membranes scarcely united. Dorsal originating just behind base of ventrals; spinous portion about $1\frac{1}{3}$ as long and not quite so deep as the soft. Pectoral nearly as long as head. Anal nearly as deep as soft dorsal; first spine a little longer than second. Caudal rounded. Breast naked. Body with numerous ill-defined dark cross-bars; a dark streak on each side of the head, passing through the eye, and a dark vertical bar below the eye; spinous dorsal with two dark bands; soft dorsal and caudal marbled or spotted with brown.

Total length 50 millim.

New Braunfels, Texas.

### 10. Etheostoma jessiæ.

Pœcilichthys jessiæ, *Jord. & Brayt., in Jord. Man. Vert. N. U.S.* 2nd ed. p. 227 (1878), *and Bull. U.S. Nat. Mus.* no. 12, 1878, p. 59; *Jord. & Gilb. Syn. Fish. N. A.* p. 518 (1882).

Pœcilichthys asprigenis, *Forbes, in Jord. Man.* 2nd ed. p. 404, *and Bull. Illin. Lab. N. H.* i. 1878, p. 41; *Jord. & Gilb. l. c.*

Pœcilichthys swaini, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 479.

Etheostoma jessiæ, *Jord. Rep. U.S. Fish Comm.* 1885, p. 869, *and Man.* 5th ed. p. 133 (1888), *and Bull. U.S. Fish Comm.* viii. 1889, p. 165; *Everm. & Kend. Bull. U.S. Fish Comm. f.* 1892, pl. xxxvi. (1894).

D. XI–XII, 12. A. II 8–9. Sc. 41–55 $\frac{4-6}{-}$; l. l. 34–41.

Depth of body $4\frac{1}{2}$ to 5 times in total length, length of head 4 times. Diameter of eye greater than length of snout; mouth terminal, oblique, jaws even or upper slightly longest; cheeks and opercles scaly; gill-membranes narrowly united. Breast naked. Brownish or greenish, dark-mottled or cross-barred; fins speckled.

Total length 75 millim.

Tennessee to Wabash Valley, Illinois, and E. Texas.

### 11. Etheostoma ioæ.

Etheostoma ioæ, *Jord. & Meek, in Jord. Man. Vert. N. U.S.* 5th ed. p. 133 (1888); *Eigenm. Am. Nat.* 1892, p. 962; *Meek, Bull. U.S. Fish Comm.* x. 1892, pp. 226 & 236; *Eigenm. Bull. U.S. Fish Comm. f.* 1894, p. 117 (1894).

D. VIII–X, 10–11. A. II 6–8. Sc. 55–63 $\frac{4-5}{11-14}$; l. l. 20–34.

Depth of body 4 to 5 times in total length, length of head $3\frac{1}{3}$ to

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4 times. Diameter of eye greater than length of snout, greater than interorbital width, about 4 times in length of head; lower jaw nearly as long as upper; maxillary extending to below anterior third or centre of eye; cheeks and opercles naked or scaly; opercular spine moderate: distance between mouth and gill-cleft (measured on the median line) about $\frac{1}{2}$ length of head. Dorsal originating behind base of ventrals; spinous portion $1\frac{1}{4}$ to $1\frac{2}{3}$ as long, and about $\frac{2}{3}$ as deep as the soft. Pectoral as long as or a little shorter than the head. Anal as deep as soft dorsal; spines subequal. Caudal rounded. Breast naked. Yellowish to green above, blotched with darker; a more or less distinct lateral series of large dark spots; a dark vertical streak below the eye; spinous dorsal shaded with red, with or without a median series of black spots, the edge blackish; soft dorsal and caudal barred.

Total length 57 millim.

Western Canada, Iowa.

*a*. Many specs. Swift Current, Assiniboia. Prof. Eigenmann [C.].

### 12. Etheostoma luteovinctum.

Etheostoma (Etheostoma) luteovinctum, *Gilb. & Swain, Proc. U.S. Nat. Mus.* x. 1887, p. 58.

D. IX–X, 13. A. II 7. Sc. 49–55 $\frac{6}{11}$; l. l. 30–35.

Back elevated, tail very slender. Depth of body $4\frac{3}{4}$ times in total length, length of head $3\frac{3}{4}$ times. Eye longer than snout, $3\frac{1}{2}$ to 4 times in length of head; mouth low, horizontal; maxillary reaching to below anterior border of eye; cheeks and opercles scaly; gill-membranes narrowly connected. Dorsal low, the two portions well separated, the spinous but little longer than the soft. Pectoral as long as head. Breast entirely or partially naked. Very pale olive, with seven dark cross-bars on back; sides with nine dark greenish blotches, between which are orange-yellow cross-bars; small black spots at base of caudal; spinous dorsal with a median orange band and a darker blotch behind; second dorsal and caudal barred.

Total length 50 millim.

Stone River, Tennessee.

### 13. Etheostoma lepidum.

Boleosoma lepida, *Baird & Gir. Proc. Ac. Philad.* 1853, p. 388; *Günth.* i. p. 77 (1859); *Vaill. N. Arch. Mus.* ix. 1873, p. 90.

Pœcilichthys lepidus, *Gir. Rep. U.S. Mex. Bound. Surv., Ichth.* p. 11, pl. viii. figs. 14–17 (1859); *Jord. & Gilb. Syn. Fish N. A.* p. 517 (1882).

Oligocephalus lepidus, *Gir. Proc. Ac. Philad.* 1859, p. 67.

? Oligocephalus grahami, *Gir. l. c.* p. 102.

? Oligocephalus leonensis, *Gir. l. c.*

? Oligocephalus pulchellus, *Gir. l. c.*

? Boleosoma grahami, *Vaill. l. c.*

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? Boleosoma leonensis, *Vaill. l. c.* p. 95.
Etheostoma lepidum, *Jord. Rep. U.S. Fish Comm.* 1885, p. 869; *Everm. & Kend. Bull. U.S. Fish Comm. f.* 1892, p. 114 (1894).

D. IX–X, 10–13. A. II 6–8. Sc. 48–54 $\frac{6-7}{}$; l. l. 27–36.

Depth of body $4\frac{2}{3}$ times in total length, length of head $4\frac{1}{4}$ times. Eye large; mouth moderate, with equal jaws; maxillary reaching to below anterior border of eye; præopercle crenulate; head entirely naked. The two portions of the dorsal somewhat connected, the first rather low. Breast naked. Olivaceous, with some dark bars; dorsals and caudal mottled or barred.

Total length 60 millim.

Texas and Chihuahua, North Mexico.

### 14. Etheostoma pottsii.

Aplesion pottsii, *Girard, Proc. Ac. Philad.* 1859, p. 102 *.
Boleosoma pottsii, *Vaill. N. Arch. Mus.* ix. 1873, p. 94.
Etheostoma micropterus, *Gilbert, Proc. U.S. Nat. Mus.* xiii. 1890, p. 289; *Everm. & Kend. Bull. U.S. Fish Comm. f.* 1892, pl. xxxv. (1894).

D. IX–XI, 10–12. A. II 7–8. Sc. 44–50 $\frac{5}{9-11}$; l. l. 23–31.

Depth of body $3\frac{2}{3}$ to 4 times in total length, length of head $3\frac{1}{2}$ to $3\frac{2}{3}$ times. Snout short, with rounded profile; diameter of eye $\frac{1}{4}$ length of head, longer than snout and than interorbital width; maxillary extending to below anterior third of eye; opercular spine moderate, bifid; head naked; distance between mouth and gill-cleft (measured on the median line) half length of head. Dorsal low, the two portions joined at the base. Anal small, spines strong, first longest. Pectoral considerably shorter than head. Lateral line usually reaching to below middle of soft dorsal; breast naked. Light olive, obscurely tessellated with darker; nine short dark cross-bars on back, and traces of about an equal number on middle of sides; a black humeral scale; a faint dark streak downwards and one forwards from eye, and a small dark spot above and behind orbit; spinous dorsal with a basal series of small blackish spots; soft dorsal and caudal barred.

Total length 37 millim. Grows to 45 millim.

Chihuahua R., North Mexico.

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| *a–b.* Hgr. | Chihuahua. | Prof. Eigenmann. |
| *c–e.* Hgr. | Chihuahua. | A. J. Woolman, Esq. [C.]. |

### 15. Etheostoma quappellæ.

Etheostoma quappelle, *Eigenm. Am. Nat.* 1892, p. 963, *and Bull. U.S. Fish Comm. f.* 1894, p. 117 (1894).

D. IX, 10. A. II 7. Sc. 53 $\frac{3-4}{10}$; l. l. 19.

Depth of body 5 times in total length, length of head $3\frac{2}{3}$ times.

* *Fide* Jordan, *in litt.*

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Diameter of eye much greater than length of snout or interorbital width, $3\frac{1}{2}$ times in length of head; lower jaw extending as far as upper; maxillary reaching to below anterior third of eye; cheeks and opercles with a few scales; opercular spine moderate; distance between mouth and gill-cleft (measured on the median line) $\frac{1}{2}$ length of head. Dorsal originating behind base of ventrals; spinous portion $1\frac{1}{3}$ as long, and nearly as deep as the soft. Pectoral $\frac{2}{3}$ length of head. Anal as deep as dorsal. Caudal rounded. Pale olive, with a lateral series of ill-defined large darker spots; in life with about eight dark blue bars on the side, alternating with rusty bars; dorsal and caudal fins barred.

Total length 44 millim.

Western Canada.

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| *a*. Hgr. | Qu'Appelle R., Assiniboia. | Prof. Eigenmann [C.]. (Type.) |

### 16. Etheostoma quiescens.

Pœcilichthys quiescens, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 478.

Etheostoma quiescens, *Jord. Rep. U.S. Fish Comm.* 1885, p. 869, *and Bull. U.S. Fish Comm.* viii. 1889, p. 120; *Woolman, Bull. U.S. Fish Comm.* x. 1892, pp. 294, 297, & 299, pl. liii. fig. 3.

D. IX–XII, 9–12. A. II 7. Sc. 48–56 $\frac{2-3}{10}$; l. l. 21–28.

Depth of body $4\frac{2}{3}$ to 6 times in total length, length of head $3\frac{2}{3}$ to 4 times. Diameter of eye much greater than length of snout, $3\frac{1}{2}$ times in length of head; mouth small, oblique, lower jaw included; maxillary extending to below anterior border or anterior third of eye; cheeks and opercles scaly; opercular spine strong; gill-membranes somewhat connected, meeting at an acute angle. The two portions of the dorsal somewhat connected by membrane, the soft a little deeper and shorter than the spinous. Anal much smaller than soft dorsal, its spines equal, rather long and slender. Caudal long, rounded or somewhat pointed. Pectoral a little shorter than head. Breast closely scaled. Colour, in spirit, dark brown, with darker markings; a vertical row of small dark spots along base of caudal; dorsals and caudal cross-barred, forming fine checkers; a dusky blotch on front of dorsal; four dark streaks radiating from eye.

Total length 50 millim.

Georgia and Florida.

### 17. Etheostoma fusiforme.

Boleosoma fusiformis, *Girard, Proc. Bost. Soc. N. H.* v. 1854, p. 41.

Boleosoma barratti, *Holbr. Journ. Ac. Philad.* (2) iii. 1855, p. 56, pl. vi. fig. 3.

Boleosoma gracile, *Girard, Proc. Ac. Philad.* 1859, p. 103.

Boleichthys elegans, *Gir. l. c.* p. 104.

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Hololepis fusiformis, *Cope, Proc. Ac. Philad.* 1864, p. 233; *Vaill. N. Arch. Mus.* ix. 1873, p. 131, pl. iii. fig. 8.
Hololepis erochrous, *Cope, l. c.*; *Vaill. l. c.* p. 133, pl. iii. fig. 9.
Hololepis barrattii, *Cope, l. c.*; *Vaill. l. c.* p. 127, pl. iii. fig. 7.
Boleichthys elegans, *Jord. Ann. Lyc. N. Y.* xi. 1877, p. 308.
Boleichthys eos, *Jord. & Copeland, Proc. Ac. Philad.* 1877, p. 46; *Jord. Man. Vert. N. U.S.* 2nd ed. p. 228 (1878).
Boleichthys fusiformis, *Jord. Man.* 2nd ed. p. 228.
Boleichthys erochrous, *Jord. l. c.*
Pœcilichthys butlerianus, *Hay, in Jord. & Gilb. Syn. Fish. N. A.* pp. 519 & 973 (1882).
Pœcilichthys barrattii, *Jord. & Gilb. l. c.* p. 519.
Pœcilichthys fusiformis, *Jord. & Gilb. l. c.* p. 520.
Pœcilichthys erochrous, *Jord. & Gilb. l. c.*
Pœcilichthys eos, *Jord. & Gilb. l. c.*
Pœcilichthys gracilis, *Jord. & Gilb. l. c.* p. 521.
Pœcilichthys palustris, *Gilb. Proc. U.S. Nat. Mus.* vii. 1884, p. 209.
Etheostoma fusiforme, *Jord. Rep. U.S. Fish. Comm.* 1885, p. 869, *Man. Vert. N. U.S.* 5th ed. p. 134 (1888), *and Bull. U.S. Fish Comm.* viii. 1889, p. 117; *Woolman, Bull. U.S. Fish Comm.* 1892, pp. 262 & 271; *Evcrm. & Kend. Bull. U.S. Fish Comm. f.* 1892, p. 115, pl. xxxvi. (1894).
Etheostoma eos, *Jord. Man.* 5th ed. p. 134.

D. IX–X, 9–12. A. II 6–7. Sc. 43–58 $\frac{3-4}{12}$; l. l. 10–26.

Depth of body 5 to 6 times in total length, length of head 4 times. Diameter of eye greater than length of snout, 3 to 4 times in length of head; mouth terminal or subinferior; maxillary extending to below anterior fourth or anterior third of eye; cheeks and opercles scaly; opercular spine strong; gill-membranes scarcely connected. The two portions of the dorsal subequal, or the spinous a little lower and longer than the soft. Anal spines small. Caudal rounded. Lateral line forming a slight curve above pectoral. Olive, with darker markings; back and sides with 12 green or dark-blue cross-bars; sides sometimes with red spots; first dorsal black or blue and red; other fins mottled or barred; a dark streak on each side of the head, and another vertical one below the eye.

Total length 60 millim.

Massachusetts to South Carolina, Indiana, Kansas, and Texas.

### 18. Etheostoma exile.

Boleichthys exilis, *Gir. Proc. Ac. Philad.* 1859, p. 103.
Boleichthys warreni, *Gir. l. c.* p. 104.
Boleosoma exile, *Vaill. N. Arch. Mus.* ix. 1873, p. 95.
Boleosoma warreni, *Vaill. l. c.* p. 97.
Pœcilichthys exilis, *Jord. & Gilb. Syn. Fish. N. A.* p. 521 (1882).
Pœcilichthys warreni, *Jord. & Gilb. l. c.*
Etheostoma exile, *Jord. Rep. U.S. Fish Comm.* 1885, p. 869; *Bollman, Bull. U.S. Fish Comm.* viii. 1890, p. 224.

D. VII–X, 10–11. A. II 7–9.

Length of head about 4 times in total length. Diameter of eye $3\frac{1}{2}$ times in length of head; maxillary reaching to below anterior

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third of eye; cheeks naked, opercles scaly. Scales as in *E. fusiforme*. Yellowish brown, spotted or speckled with black; dorsal and caudal fins barred; a dark streak in front of the eye and another below it.

Total length 50 millim.

Upper Missouri and Cannon Ball River.

According to Bollman probably only a variety of *E. fusiforme*.

### 19. Etheostoma virgatum.

Pœcilichthys virgatus, *Jord. Proc. U.S. Nat. Mus.* ii. 1879, p. 236*; *Jord. & Gilb. Syn. Fish. N. Am.* p. 515 (1882).

Etheostoma virgatum, *Jord. Rep. U.S. Fish Comm.* 1885, p. 868.

D. IX, 10. A. II 8. Sc. 53; l. l. 20 (circa).

Depth of body 5 times in total length, length of head $3\frac{2}{3}$ times. Snout pointed; eye rather large, its diameter a little greater than the length of the snout, 4 times in length of head; mouth somewhat oblique, lower jaw scarcely shorter than upper; maxillary reaching to below anterior third of eye; posterior border of præopercle obtusely crenulate; head naked; gill-membranes not connected. Lateral line rather indistinct. Colour greenish, each scale with a small blackish spot, forming conspicuous lateral stripes; back and sides with cross-blotches; a large black humeral scale; dorsal and caudal fins faintly barred.

Total length 65 millim.

Kentucky.

### 20. Etheostoma cragini.

Etheostoma cragini, *Gilb. Bull. Washburn Coll. Lab.* 1885, p. 99, *and Bull. U.S. Nat. Mus.* x. 1887, p. 62.

D. VIII–IX, 10–12. A. II 6–7. Sc. 46–55 $\frac{6-7}{14-15}$; l. l. 15–20.

Depth of body $4\frac{2}{3}$ to 5 times in total length, length of head $3\frac{1}{4}$ to $3\frac{1}{3}$ times. Snout much shorter than eye, which is $3\frac{1}{2}$ times in length of head; interorbital space very narrow; mouth terminal, little oblique, lower jaw included; maxillary reaching to below anterior third of eye; cheeks and opercles naked or with a few scales; opercular spine feebly developed; gill-membranes not joined across the isthmus. Spinous portion of dorsal low. Anal very small; first spine longer and stronger than second. Caudal truncate. Breast naked. Olivaceous, much mottled with dusky above; lower half of sides sprinkled with coarse black specks, and with traces of two silvery lines; middle of sides with a series of 12 dusky spots as large as pupil, the interspaces silvery; a black

* In his original description, Prof. Jordan states that one of the type-specimens has been forwarded to the British Museum. No such specimen, however, appears to have been received, nor do I find any bearing the locality whence the species was obtained.

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humeral scale; a black spot on opercle, one behind and one below orbit; spinous dorsal margined with blackish; soft dorsal, anal, and caudal barred.

Total length 40 millim.

Kansas and Colorado.

*a–c.* Hgr. Arkansas R., Cañon City, Colorado. Prof. Eigenmann.

### 21. Etheostoma obeyense.

Etheostoma obeyense, *Kirsch, Bull. U.S. Fish Comm.* x. 1892, p. 292, fig.

D. VIII–X, 12–13. A. II 7–9. Sc. 45–50 $\frac{5-6}{8-12}$; l. l. 10–27.

Depth of body $4\frac{1}{2}$ to $5\frac{1}{2}$ times in total length, length of head $3\frac{1}{2}$ to $3\frac{2}{3}$ times. Diameter of eye about equal to length of snout, greater than interorbital width, 4 times in length of head; jaws equal; maxillary extending nearly to below centre of eye; head naked; opercular spine moderate; distance between mouth and gill-cleft (measured on the median line) half length of head. Spinous portion of dorsal a little shorter than and nearly as deep as the soft. Pectoral as long as or a little shorter than the head. Anal as deep as dorsal; spines short, subequal. Caudal rounded. Breast naked. Light olive, with a lateral series of dark spots; males with seven dark cross-bars on the back, and a black spot on the dorsal fin between the first three or four spines; soft dorsal and caudal with more or less distinct dark bars; a black humeral scale.

Total length 66 millim.

Clinton County, Kentucky.

*a–e.* Ad. & hgr. Albany Branch, Kentucky. P. H. Kirsch, Esq. [C.]. (Some of the types.)

*f–o.* Ad. & hgr. Albany Branch, Kentucky. A. J. Woolman, Esq. [C.].

### 22. Etheostoma boreale.

Pœcilichthys borealis, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 477.
Etheostoma boreale, *Jord. Rep. U.S. Fish Comm.* 1885, p. 868.

D. VIII, 9. A. II 7. Sc. 53 $\frac{4}{10}$; l. l. 15.

Depth of body $5\frac{2}{3}$ times in total length, length of head $3\frac{3}{5}$ times. Snout rather strongly decurved, about half as long as eye, which measures $\frac{1}{4}$ length of head; mouth nearly horizontal, lower jaw included; maxillary extending to below anterior third of eye; cheeks and opercles scaly; opercular spine strong; gill-membranes not broadly connected. Dorsals unusually short and small, the two portions well separated. Anal low and short; spines long, first longest. Pectoral nearly as long as head. Caudal truncate or slightly notched. Breast naked. Dark grey (red?) with 11 or 12 very distinct (blue?) cross-bands, each alternate one meeting its fellow below; first dorsal with a median dark band; second dorsal barred; a black humeral scale.

Total length 65 millim.

Montreal, Canada.

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### 23. Etheostoma pagii.

Etheostoma pagei, *Meek, Am. Nat.* 1894, p. 957.

D. IX–X, 12–13. A. II 7. Sc. 56–61 $\frac{8}{13}$; l. l. 12.

Depth of body 4 to $4\frac{1}{2}$ times in total length, length of head $3\frac{1}{2}$ times. Snout abruptly rounded but not blunt, as long as diameter of eye, which is $3\frac{1}{2}$ times in length of head; mouth terminal; maxillary extending to below centre of eye; cheeks and opercles naked; gill-membranes not connected. Olive above, with darker markings, each scale with a black spot, and about nine blotches on the side, resembling faint bars; male bright red on the belly, which is separated from the olive upper parts by a yellowish lateral band; caudal and soft dorsal fins barred; a dark humeral scale.

Total length 50 millim.

Arkansas.

### 24. Etheostoma punctulatum.

Pœcilichthys punctulatus, *Agass. Am. Journ. Sc.* (2) xvii. 1854, p. 304.
Nothonotus punctulatus, *Agass. in Putn. Bull. Mus. Comp. Zool.* i. 1863, p. 3.
Etheostoma punctulatum, *Gilb. Proc. U.S. Nat. Mus.* x. 1887, p. 60.

D. X–XI, 14. A. II 8–9. Sc. 63–80 $\frac{9-10}{16}$; l. l. 43–53.

Depth of body $4\frac{1}{2}$ to $5\frac{2}{3}$ times in total length, length of head 3 to $3\frac{1}{2}$ times. Eye longer than snout, $3\frac{1}{2}$ times in length of head; mouth terminal; maxillary extending to below anterior third or centre of eye; cheeks and opercles naked; opercular spine strong and slender; gill-membranes not united. The two portions of the dorsal not joined. First anal spine stronger but not longer than second. Caudal truncate. Lateral line ending below last rays of soft dorsal. Breast naked. Dark slaty green, with faint dark bars; belly orange-red; body and fins speckled with black; first dorsal with a black band; a black humeral scale.

Total length 50 millim.

S.W. Missouri.

*a*. Hgr. James Fork, Marshfield, Missouri. Prof. Eigenmann.

### 25. Etheostoma tippecanoe.

Etheostoma tippecanoe, *Jord. & Everm. Proc. U.S. Nat. Mus.* xiii. 1890, p. 3, and *Errata* (not fig.).

D. XII, 12. A. II 7. Sc. 50 $\frac{5}{-}$; l. l. 23.

Depth of body $4\frac{3}{4}$ times in total length, length of head $4\frac{1}{4}$ times. Snout pointed; eye as long as snout, $4\frac{1}{2}$ times in length of head; mouth large, oblique, lower jaw somewhat included; maxillary reaching nearly to below centre of eye; cheeks naked, or with one or two scales above; opercles scaly; opercular spine strong; gill-membranes nearly separate. The two portions of the dorsal slightly connected. Anal spines subequal. Pectoral about as long as head. Caudal subtruncate. Colour dark; body with twelve dark (blue?) cross-bands; a dark spot at base of caudal; a black humeral scale;

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first dorsal dark, second dorsal, anal, caudal, and pectorals barred; three dark streaks diverging from eye.

Total length 40 millim.

Tippecanoe River, Indiana.

### 26. Etheostoma nigrofasciatum.

Hadropterus nigrofasciatus, *Agass. Am. Journ. Sc.*, xvii. 1854, p. 305; *Jord. Ann. Lyc. N. Y.* xi. 1877, p. 310, *and Proc. U.S. Nat. Mus.* ii. 1879, p. 225; *Jord. & Gilb. Syn. Fish. N. A.* p. 506 (1882).
Plesioperca anceps, *Vaill. N. Arch. Mus.* ix. 1873, p. 37, pl. i. fig. 3.
Etheostoma nigrofasciatum, *Jord. Bull. Buff. Soc. N. H.* 1876, p. 164.
Alvordius spillmani, *Hay, Proc. U.S. Nat. Mus.* iii. 1880, p. 491.

D. XII, 11–12. A. II 9–10. Sc. 55–65 $\frac{6-7}{12-15}$; l. l. 55–60.

Depth of body 5 to $5\frac{1}{2}$ times in total length, length of head 4 times. Diameter of eye equal to length of snout and width of interorbital space, and $\frac{1}{4}$ length of head; maxillary extending to below posterior nostril or anterior border of eye; cheeks and opercles scaled; a strong opercular spine; distance between mouth and gill-cleft (measured on the median line) $\frac{2}{3}$ length of head. Dorsal originating just behind vertical of base of ventrals; spinous portion about $1\frac{1}{2}$ as long and not quite so deep as the soft; first spine considerably shorter than second. Pectoral nearly as long as head. Anal as long and as deep as soft dorsal; spines subequal. Caudal truncate. Breast and ventral line scaly. Olive above, with more or less distinct blackish vertical bars on the sides; a dark streak on each side of the head, passing through the eye.

Total length 69 millim.; reaches to 100.

S.E. United States, from South Carolina to Louisiana.

| | | |
|---|---|---|
| *a*. Ad. | Mobile, Alabama. | Smithsonian Instit. |
| *b*. Hgr. | Alabama R. | Prof. D. S. Jordan. |

### 27. Etheostoma scierum.

Hadropterus scierus, *Swain, Proc. U.S. Nat. Mus.* vi. 1883, p. 252.
Serraria sciera, *Gilb. Proc. U.S. Nat. Mus.* vii. 1884, p. 205.
Etheostoma scierum, *Jord. Man. Vert. N. U.S.* 5th ed. p. 127 (1888), *and Bull. U.S. Fish Comm.* viii. 1889, pp. 160 & 164.
Hadropterus scierus, var. serrula, *Jord. & Gilb. Proc. U.S. Nat. Mus.* ix. 1886, p. 16.

D. XIII, 13–14. A. II 9. Sc. 68–70 $\frac{7-8}{17}$; l. l. 64–71.

Depth of body 5 to 6 times in total length, length of head 4 to $4\frac{4}{5}$ times. Diameter of eye nearly equal to length of snout and width of interorbital space, and $\frac{1}{4}$ length of head; maxillary extending to below posterior nostril or anterior border of eye; præopercle more or less distinctly serrate, especially in the young; cheeks and opercles scaled; a strong opercular spine; distance between mouth and gill-cleft (measured on the median line) $\frac{2}{5}$ length of head. Dorsal originating above base of ventrals; spinous portion $1\frac{3}{5}$ as long, and as deep as the soft; first spine considerably shorter than second. Pectoral nearly as long as head. Anal a little shorter and a little deeper than soft dorsal; spines subequal. Caudal truncate.

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Breast naked or scaled; belly scaled. Yellowish olive, vaguely blotched with black; dorsal and caudal fins with dusky bars; fins black in the males; a blackish streak on each side of the head, passing through the eye.

Total length 95 millim.

From Indiana to Arkansas and Texas.

*a, b.* Ad. & hgr. Bean Blossom Creek, Monroe Co., Indiana. Prof. Eigenmann.

### 28. Etheostoma variatum.

Etheostoma variata, *Kirtland, Bost. Journ. N. H.* iii. 1840, p. 274, pl. ii. fig. 2; *Jord. Man. Vert. N. U.S.* 5th ed. p. 129 (1888); *Woolman, Bull. U.S. Fish Comm.* x. 1892, p. 280.
Boleosoma variatum, *Vaill. N. Arch. Mus.* ix. 1873, p. 84.
Hadropterus variatus, *Jord. Rep. U.S. Fish Comm.* 1885, p. 867.

D. XII–XIV, 11–13. A. II 7–9. Sc. 51–63 $\frac{8}{12}$; l. l. 51.

Depth of body $4\frac{4}{5}$ to 5 times in total length, length of head $3\frac{1}{3}$ to $3\frac{4}{5}$ times. Snout short, with convex profile; diameter of eye $3\frac{1}{3}$ to $3\frac{2}{4}$ times in length of head; mouth small, horizontal; maxillary extending to below anterior border of eye; head almost naked, only a few scales on opercles; gill-membranes broadly united, the distance between mouth and gill-cleft (measured on median line) $\frac{2}{3}$ length of head. The two portions of the dorsal subcontiguous, spinous longest. Anal nearly as long and as deep as the soft dorsal. Pectoral as long as head. Lateral line complete. Breast scaly. Male dusky greenish, finely punctate; belly and sides orange-yellow; posterior part of body with five orange bands; spinous dorsal with dark blue bands; soft dorsal, anal, and pectoral blue-black, shaded with orange; female paler.

Total length 100 millim.

Ohio Valley.

*a.* Hgr. Big Creek, Hyden, Kentucky. Prof. Eigenmann.

### 29. Etheostoma swannanoa.

Etheostoma swannanoa, *Jord. & Everm. Proc. U.S. Nat. Mus.* xi. 1888, p. 360, pl. xlv. fig. 13.

D. XI–XII, 12–14. A. II 9. Sc. 48–57 $\frac{6}{-}$.

Depth of body $4\frac{1}{2}$ * times in total length, length of head $4\frac{1}{3}$ times. Snout very short, with strongly convex profile; diameter of eye 4 times in length of head; mouth small, horizontal; maxillary extending to below anterior border of eye; head naked; gill-membranes broadly connected. The two portions of the dorsal contiguous, spinous longest. Anal much shorter than soft dorsal.

* According to the figure; 6 times according to the text.



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Pectoral long, one-third longer than head. Caudal rounded. Lateral line complete; breast naked. Olive-green above; six dark green cross-blotches on back, and 8 to 10 roundish spots on side: a faint bar below eye; axil black; base and tip of dorsal snuffy brown; female and young more speckled, the pectorals and caudal barred with dark.

Total length 75 millim.

Virginia and North Carolina.

### 30. Etheostoma cinereum.

Etheostoma cinerea, *Storer, Proc. Bost. Soc. N. H.* ii. 1845, p. 49; *Kirsch, Bull. U.S. Fish Comm. f.* 1891, p. 264 (1893).

Nothonotus ? cinereus, *Jord. & Gilb. Syn. Fish. N. Am.* p. 509 (1882).

D. XI–XII, 11–13. A. II 8. L. l. 57–60.

Depth of body 5½ times in total length, length of head about 3½ times. Head pointed, upper jaw projecting; diameter of eye greater than length of snout, ¼ length of head; interorbital region narrow; maxillary not reaching to below front of eye; opercles covered with scales; a small opercular spine; gill-membranes united. Spinous and soft portions of dorsal equal in length, latter deepest; first spine shorter than second. Anal shorter than soft dorsal; first spine shorter than second. Lateral line complete; breast naked. Light yellow, with four dark bars across back, the last on caudal peduncle; a series of 11 or 12 oblong spots along the lateral line; first dorsal margined with red; second dorsal and anal variegated with red spots.

Total length 100 millim.

Florence, Alabama; Obeys River, Tennessee.

### 31. Etheostoma rupestre.

Etheostoma (Rhothœca) rupestre, *Gilb. & Swain, Proc. U.S. Nat. Mus.* x. 1887, p. 57.

D. XI–XII, 11–12. A. II 7–8. Sc. 50–57 $\frac{6-7}{}$.

Depth of body 5¾ times in total length, length of head 3¼ to 4 times. Eye a little longer than snout, twice interorbital width; mouth small, horizontal, terminal; maxillary extending to below anterior border of eye; cheeks naked; opercles scaly; gill-membranes widely joined. Anal spines short. Pectoral long. Caudal notched. Lateral line complete; breast naked. Grass-green, with darker markings, but no red or blue; back with six dark cross-bars; a series of dark blotches along side, immediately below lateral line; a dark bar downwards, and one downwards and forwards from eye; fins with wavy dusky bars.

North River, Alabama.

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### 32. Etheostoma zonale.

Pœcilichthys zonalis, *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 212.
Astatichthys zonalis, *Vaill. N. Arch. Mus.* ix. 1873, p. 110.
Nanostoma vinctipes, *Jord. Proc. U.S. Nat. Mus.* ii. 1879, p. 236.
Nanostoma elegans, *Hay, Proc. U.S. Nat. Mus.* iii. 1880, p. 493; *Jord. & Gilb. Syn. Fish. N. A.* p. 511 (1882).
Nanostoma zonale, *Jord. & Gilb. l. c.* p. 510.
Etheostoma zonale, *Jord. Rep. U.S. Fish Comm.* 1885, p. 868; *Gilb. Proc. U.S. Nat. Mus.* x. 1887, p. 54.
Etheostoma lynceum, *Hay, in Jord. l. c.*
Etheostoma zonale arcansanum, *Jord. & Gilb. Proc. U.S. Nat. Mus.* ix. 1886, p. 5.

D. X–XI, 10–12. A. II 6–8. Sc. 42–53 $\frac{5-6}{6-9}$; l. l. 44–50.

Depth of body 5 to 6 times in total length, length of head 4 to 5 times. Snout very short, profile strongly curved; diameter of eye greater than length of snout or interorbital width, 3½ to 4 times in length of head; mouth small; maxillary extending to below anterior border of eye, or not quite so far; cheeks and opercles scaly; opercular spine rather feeble; distance between mouth and gill-cleft (measured on the median line) about ⅔ length of head. Dorsal originating just behind vertical of base of ventrals; the two portions well separated, the spinous longer than the soft, but not quite so deep. Anal much shorter than soft dorsal; first spine a little longer and stronger than second. Pectoral as long as or a little longer than head. Caudal truncate. Breast scaly (rarely naked). Olivaceous or pale brownish above, much spotted with brown, and with more or less distinct vertical dark bars on the sides; a dark streak on the side of the snout and another, vertical, one below the eye; a dark spot at base of pectoral; all the fins barred; ventrals and anal blue in the male.

Total length 52 millim.

Mississippi and Ohio Valleys.

| | | | |
|---|---|---|---|
| *a–d.* | Ad. | Yellow River, Plymouth, Indiana. | U.S. Fish Commission. |

### 33. Etheostoma thalassinum.

Hadropterus tessellatus, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 7 (*nec* E. tessellatum, *Storer*).
Nothonotus thalassinus, *Jord. & Brayt. Bull. U.S. Nat. Mus.* no. 12, 1878, p. 13.
Nothonotus inscriptus, *Jord. & Brayt. l. c.* p. 34.
Nanostoma thalassinum, *Jord. & Gilb. Syn. Fish. N. A.* p. 511 (1882).
Nanostoma tessellatum, *Jord. & Gilb. l. c.*
Nanostoma inscriptum, *Jord. & Gilb. l. c.* p. 512.
Etheostoma thalassinum, *Jord. Rep. U.S. Fish Comm.* 1885, p. 868, *and Bull. U.S. Fish Comm.* viii. 1889, p. 139.
Etheostoma inscriptum, *Jord. Rep. U.S. Fish Comm.* 1885, p. 868.
? Etheostoma (Rhothœca) blennius, *Jord. & Swain, Proc. U.S. Nat. Mus.* x. 1887, p. 55; *Gilb. Bull. U.S. Fish Comm.* ix. 1891, p. 150.



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D. IX–XI, 10–12. A. II 7–8. Sc. 40–48 $\frac{5}{7-8}$.

Depth of body $4\frac{3}{4}$ to 5 times in total length, length of head $3\frac{3}{5}$ to 4 times. Diameter of eye nearly equal to length of snout, greater than interorbital width, $3\frac{1}{2}$ to 4 times in length of head; maxillary reaching hardly to below anterior border of eye; head entirely naked; opercular spine very obtuse; the distance between the mouth and the gill-cleft (measured on the middle line) equals about $\frac{2}{3}$ length of head. The two portions of the dorsal contiguous or narrowly separated, the spinous $1\frac{1}{4}$ to $1\frac{1}{3}$ as long, and nearly as deep as the soft. Anal slightly shorter than soft dorsal; first spine a little longer and stronger than second. Pectoral as long as head. Caudal emarginate. Lateral line complete; breast naked. Olive or green, with more or less distinct darker vertical bars on the sides; spinous dorsal with a black band in the male; pectorals, dorsals, and caudal barred in the female; a dark streak in front of the eye, and another, vertical, below the eye.

Total length 60 millim.

Virginia and Carolina.

| | | |
|---|---|---|
| *a*. Ad. | Saluda R., S. Carolina. | Prof. D. S. Jordan. |
| *b*. Ad. | Buck's Creek, Pleasant Garden, N. Carolina. | U.S. Fish Commission. |

### 34. Etheostoma squamatum.

Etheostoma (Hadropterus) squamatus, *Gilb. & Swain, Proc. U.S. Nat. Mus.* x. 1887, p. 50.

Etheostoma squamatum, *Jord. Man. Vert. N. U.S.* 5th ed. p. 129 (1888), *and Bull. U.S. Fish Comm.* viii. 1889, p. 153.

D. XIV, 13. A. II 10. Sc. 82 $\frac{10}{18}$.

Depth of body $5\frac{1}{2}$ times in total length, length of head $3\frac{5}{7}$ times. Snout long and acuminate, nearly once and a half as long as eye, which enters $4\frac{3}{4}$ times in length of head; mouth narrow, lower jaw included; maxillary reaching to below anterior border of eye; cheeks and opercles scaly; gill-membranes broadly united. The two portions of the dorsal well separated, spinous longer and lower than the soft. Anal shorter but deeper than soft dorsal. Lateral line complete; breast scaly. Yellow-olive or green, with ten dark blotches along side; a black humeral scale; a small black spot at base of caudal; first dorsal pale, with broad orange band; second dorsal and caudal barred with dusky and orange.

Total length 120 millim.

French Broad River, Tennessee Basin.

### 35. Etheostoma whipplii.

Boleichthys whipplii, *Gir. Proc. Ac. Philad.* 1859, p. 103.

Boleosoma whipplii, *Vaill. N. Arch. Mus.* ix. 1873, p. 96.

Pœcilichthys artesiæ, *Hay, Proc. U.S. Nat. Mus.* iii. 1880, p. 494; *Jord. & Gilb. Syn. Fish. N. A.* p. 516 (1882).

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Pœcilichthys punctulatus (*non Ag.*), *Jord. & Gilb. l. c.*
Etheostoma artesiæ, *Jord. Rep. U.S. Fish Comm.* 1885, p. 868.
Etheostoma whipplei, *Jord. l. c.* p. 869; *Gilb. Proc. U.S. Nat. Mus.* x. 1887, p. 61; *Jord. Man. Vert. N. U.S.* 5th ed. p. 131 (1888).
Etheostoma whipplei alabamæ, *Gilb. l. c.* p. 62.

D. IX–XII, 12–14. A. II 7. Sc. 50–70 $\frac{7-9}{20}$; l. l. 40–50.

Depth of body 4½ to 5 times in total length, length of head 3½ to 3¾ times. Eye slightly longer than snout, 4 to 4¼ times in length of head; mouth terminal, oblique, jaws equal; maxillary reaching to below anterior third of eye; cheeks naked or with imbedded scales; opercles scaly; gill-membranes broadly united. Soft dorsal considerably deeper and a little shorter than the spinous. Pectoral short. Lateral line sometimes nearly complete. Greyish or yellowish olive, with more or less distinct darker bars; sides with small scarlet spots; a black humeral scale; dorsals dark, barred with orange and carmine, and tipped with blue in the male; pectorals and ventrals blue in the male; caudal barred, blue and orange.

Total length 70 millim.

Missouri to Texas and Alabama.

### 36. Etheostoma squamiceps.

Etheostoma squamiceps, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 11; *Jord. & Gilb. Syn. Fish. N. A.* p. 514 (1882); *Jord. Bull. U.S. Fish Comm.* viii. 1889, p. 165; *Gilb. Bull. U.S. Fish Comm.* ix. 1891, p. 156.
Etheostoma (Etheostoma) parvipinne, *Gilb. & Swain, Proc. U.S. Nat. Mus.* x. 1887, p. 59.

D. VIII–XI, 10–12. A. II 7–8. Sc. 48–60 $\frac{5-6}{13}$.

Depth of body 4¾ to 5 times in total length, length of head 3⅓ to 4⅓ times. Snout very short; diameter of eye about 4 times in length of head, greater than interorbital width; mouth small, oblique; maxillary reaching beyond vertical from front of orbit; cheeks naked or scaly; opercles scaly; gill-membranes very broadly united. The two portions of the dorsal subequal, scarcely joined, the spinous low, the soft much deeper. Anal spines rather weak, second longer than first. Pectoral shorter than head. Caudal rounded. Lateral line wanting only on a few of the posterior scales; breast scaly. Dusky olive, with cross-blotches on back and sides below lateral line; a black humeral scale; a dark bar below eye sometimes present; spinous dorsal with about two irregular series of black spots; soft dorsal and caudal speckled; lower fins black in the male.

Total length 70 millim.

Ohio Valley.

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### 37. Etheostoma flabellare.

Etheostoma flabellaris, *Rafin. Journ. de Phys.* lxxxviii. 1819, p. 419; *Jord. Man. Vert. N. U.S.* 2nd ed. p. 227 (1878); *Jord. & Gilb. Syn. Fish. N. A.* p. 513 (1882); *Jord. Man.* 5th ed. p. 131 (1888), *and Bull. U.S. Fish Comm.* viii. 1889, p. 139.
Etheostoma flabellata, *Rafin. Ichth. Oh.* p. 36 (1820).
Etheostoma linsleyi, *Putnam, Proc. Bost. Soc. N. H.* iv. 1851, p. 37.
Catonotus lineolatus, *Agass. Am. Journ. Sc.* (2) xvii. 1854, p. 305; *Vaill. N. Arch. Mus.* ix. 1873, p. 118.
Oligocephalus humeralis, *Gir. Proc. Ac. Philad.* 1859, p. 67.
Oligocephalus linslii, *Gir. l. c.*
Catonotus fasciatus, *Gir. l. c.* p. 68.
? Catonotus kennicotti, *Putnam, Bull. Mus. Comp. Zool.* i. 1863, p. 3.
Catonotus flabellatus, *Putnam, l. c.*; *Vaill. l. c.* p. 121, pl. iii. fig. 4.
Pœcilichthys flabellatus, *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 213, *and Proc. Am. Philos. Soc.* xi. 1870, p. 263.
Catonotus linsleyi, *Vaill. l. c.* p. 125.
Etheostoma lineolatum, *Jord. & Gilb. Syn. Fish. N. Am.* p. 513.
Etheostoma cumberlandicum, *Jord. & Swain, Proc. U.S. Nat. Mus.* vi. 1883, p. 250.

D. VI–VIII, 12–14. A. II 7–9. Sc. 40–66 $\frac{7-9}{14-20}$; l. l. 15–40.

Depth of body 4½ to 5½ times in total length, length of head 3⅘ to 4 times. Diameter of eye about equal to length of snout, greater than interorbital width, and 4 to 4½ times in length of head; lower jaw projecting; maxillary extending to below anterior border or anterior fourth of eye; head naked; opercular spine moderate; distance between mouth and gill-cleft (measured on the median line) ⅔ to ¾ length of head. Dorsal originating behind base of ventrals; spinous portion about ¾ length of soft, which is considerably deeper; spines, in the males, ending in little fleshy knobs. Pectoral as long as or shorter than head. Anal as deep as dorsal; spines short but rather strong. Caudal rounded. Lateral line ending below the spinous or the soft dorsal; breast naked. Olivaceous, with or without dark longitudinal lines or series of dots, which may be crossed by dark vertical bars; a dark streak on each side of the head, passing through the eye; a black humeral scale; soft dorsal, anal, and caudal barred with black.

Total length 62 millim.

Mississippi Basin and eastwards, as far north as Minnesota and New York.

| | | |
|---|---|---|
| *a.* Ad. | Cayuga Lake, New York. | Prof. D. S. Jordan. |
| *b–c.* Ad. | Oconomowok R., Wisconsin. | Smithsonian Instit. |
| *d.* Ad. | Rock R., Wisconsin. | Prof. D. S. Jordan. |
| *e.* Ad. | White R., Indiana. | Prof. D. S. Jordan. |
| *f.* Ad. | Bean Blossom Creek, Monroe Co., Indiana. | Prof. Eigenmann [C.]. |
| *g–h.* Hgr. | Cedar Bluffs, Monroe Co., Ind. | Prof. Eigenmann [C.]. |
| *i.* Ad. | Gosport, Monroe Co., Ind. | Prof. Eigenmann [C.]. |
| *k.* Ad. | Big Pigeon R., Evansville, Ind. | Prof. Eigenmann [C.]. |
| *l.* Ad. | Shenandoah R., Luray, Virginia. | U.S. Fish Commission. |
| *m.* Ad. | James R., Lexington, Virginia. | U.S. Fish Commission. |
| *n–r.* Ad. & hgr. | Pensacola, Florida. | Prof. D. S. Jordan. |

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### 38. Etheostoma microperca.

Microperca punctulata, *Putnam, Bull. Mus. Comp. Zool.* i. 1863, p. 4 (*nec* Etheostoma punctulatum, *Ag.*); *Jord. & Gilb. Syn. Fish. N. A.* p. 523 (1882).
Alvarius punctulatus, *Jord. Rep. U.S. Fish Comm.* 1885, p. 869.
Etheostoma microperca, *Jord. Man. Vert. N. U.S.* 5th ed. p. 134 (1888).

D. VI–VIII, 9–10. A. II 6. Sc. 34–37, tr. 9.

Depth of body 4½ to 5 times in total length, length of head 3¾ to 4 times. Snout shorter than eye, profile curved; mouth small, jaws equal; maxillary extending to below anterior border of eye; head naked, or with a few scales on the opercles; the distance between mouth and gill-cleft nearly ⅔ length of head. The two portions of the dorsal short, well separated, subequal. Anal smaller than soft dorsal; spines well developed. No lateral line; breast naked. Pale brownish, with darker dots and small spots; a dark streak in front of the eye, and another, vertical, below the eye.

Total length 27 millim.

From North Indiana to Minnesota.

| | | |
|---|---|---|
| *a–b.* Ad. | Lake Manitou. | Prof. D. S. Jordan [C.]. |
| *c.* Ad. | Wabash R., Indiana. | Smithsonian Instit. |

### 39. Etheostoma juliæ.

Etheostoma juliæ, *Meek, Bull. U.S. Fish Comm.* ix. 1891, p. 130, pl. xlii. fig. 2.

D. XI, 11–12. A. I 7. Sc. 58–60 $\frac{8}{-}$.

Depth of body 4 to 4⅕ times in total length, length of head 4 times. Snout pointed; eye 4⅓ times in length of head; mouth terminal, lower jaw the shorter; maxillary extending to below anterior third of eye; cheeks naked, opercles with a few scales; gill-membranes broadly united. The two portions of the dorsal subcontiguous and subequal in depth, the spinous much shorter than the soft. Anal shorter than soft dorsal; spine strong. Pectoral as long as the head. Caudal rounded. Lateral line incomplete; breast naked. Dusky olivaceous; a black band across back in front of spinous dorsal, a second and much fainter band between spinous and soft dorsals, a third at middle of soft dorsal, and a fourth on caudal peduncle; six faint dark vertical bars on posterior half of body; a dark bar below eye; a black humeral scale; fins yellowish, spinous dorsal dusky at base.

Total length 55 millim.

James River, Missouri.

### 40. Etheostoma laterale.

Alvarius lateralis, *Gir. Proc. Ac. Philad.* 1859, p. 101.
Pœcilichthys lateralis, *Jord. & Gilb. Syn. Fish. N. A.* p. 522 (1882).

D. VI, 10. A. 8 (I 7?).

Body slender, elongate; eye equal to length of snout, ¼ length of

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head; mouth terminal, lower jaw longer than upper; maxillary reaching to below centre of eye; cheeks and opercles scaly. First dorsal about equal to second and separated from it. Anal smaller than second dorsal. Scales very small; lateral line complete (?); breast scaly. Brownish, black-spotted; sides with a narrow blackish streak, which extends around the snout; first dorsal with a black spot on its upper posterior edge; caudal barred.

Total length 45 millim.

Rio Grande.

### 41. Etheostoma sagitta.

Pœcilichthys sagitta, *Jord. & Swain, Proc. U.S. Nat. Mus.* vi. 1883, p. 250.

Etheostoma sagitta, *Jord. Rep. U.S. Fish Comm.* 1885, p. 868.

D. X, 13. A. I 10. Sc. 68; l. l. 48.

Depth of body $4\frac{1}{5}$ times in total length, length of head $3\frac{1}{5}$ times. Head very long and slender, tapering forward to a sharp snout; snout about as long as eye, $\frac{1}{5}$ length of head; interorbital space narrow; maxillary reaching to below anterior third of eye; head naked; opercular spine well developed; gill-membranes scarcely connected. Soft portion of dorsal rather higher and shorter than the spinous. Anal nearly equal to soft dorsal, spine slender. Pectoral nearly as long as head. Caudal truncate. Lateral line extending to below last rays of soft dorsal. Dusky green, with markings of darker olive, the latter forming about nine obscure cross-bars; a dusky spot at base of caudal; a roundish orange spot in each of the pale interspaces between the bars on the side; a narrow black streak on side of head, passing through eye; first dorsal translucent, with a narrow edge of orange.

Total length 65 millim.

Wolf Creek, Kentucky.

### 42. Etheostoma australe.

Diplesion fasciatus, *Gir. Proc. Ac. Philad.* 1859, p. 101 (*nec* Catonotus fasciatus, *Gir.*).

Boleosoma fasciatum, *Vaill. N. Arch. Mus.* ix. 1873, p. 93.

Alvordius fasciatus, *Jord. & Gilb. Syn. Fish. N. A.* p. 504 (1882).

Hadropterus fasciatus, *Jord. Rep. U.S. Fish Comm.* 1885, p. 867.

Etheostoma australe, *Jord. Proc. U.S. Nat. Mus.* xi. 1888, p. 362; *Everm. & Kend. Bull. U.S. Fish Comm. f.* 1892, p. 115 (1894).

Etheostoma scovelli, *Woolman, Am. Nat.* 1892, p. 200.

D. X–XII, 9–11. A. I 7–8. Sc. 58–66 $\frac{6-7}{10-12}$; l. l. 34–44.

Depth of body $4\frac{1}{4}$ to $4\frac{2}{3}$ times in total length, length of head $3\frac{1}{2}$ to $3\frac{3}{4}$ times. Eye as long as or a little shorter than snout, about 4 times in length of head; mouth rather small, lower jaw included; maxillary reaching to below anterior third of eye; head entirely naked; opercular spine moderate; distance between mouth and gill-cleft (measured on the median line) about $\frac{3}{5}$ length of head. Dorsal originating behind base of ventrals; spinous portion

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1½ as long, and about ⅔ as deep as the soft. Pectoral as long as head. Anal spine long and strong, soft rays about as long as soft dorsals. Caudal rounded. Lateral line ending below soft dorsal; breast naked. Body with about ten dark bars; a black humeral scale; a dark bar below eye; spinous dorsal bordered with black; soft dorsal, and usually caudal, dark-barred.

Total length 40 millim.

Chihuahua River, North Mexico.

| | | |
|---|---|---|
| *a–c.* Ad. | Chihuahua River. | A. J. Woolman, Esq. [C.]. (Types of *E. scovelli.*) |
| *d–f.* Ad. | Chihuahua River. | A. J. Woolman, Esq. [C.]. |

### 43. Etheostoma tuscumbia.

Etheostoma (Etheostoma) tuscumbia, *Gilb. & Swain, Proc. U.S. Nat. Mus.* x. 1887, p. 63.

D. IX–X, 11–13. A. I 8. Sc. 48–50 $\frac{5\text{-}7}{10\text{-}11}$; l. l. 15–20.

Depth of body 4 to 4½ times in total length, length of head 3½ to 3¾ times. Snout blunt and broadly rounded, but not overhanging the mouth; diameter of eye nearly 4 times in length of head; maxillary reaching to below anterior third or centre of eye; cheeks and opercles scaly; opercular spine little developed; distance between mouth and gill-cleft (measured on the median line) ⅔ length of head. Dorsal small, spines weak, soft rays scarcely longer. Pectoral very small. Caudal broadly rounded. Breast scaly. Greyish or greenish olive, much mottled and speckled with black; six broad dark bars across back; 8 or 10 linear black blotches along lateral line, separated by silvery interspaces; a dark streak before, one below, and one behind orbit; a dark blotch at base of each caudal lobe; pectorals, dorsals, and anal more or less barred.

Total length 50 millim.

Tuscumbia, Alabama.

| | | |
|---|---|---|
| *a–b.* Hgr. | Tuscumbia Springs. | Prof. Eigenmann. (Two of the types.) |

### 44. Etheostoma prœliare.

Microperca prœliaris, *Hay, Proc. U.S. Nat. Mus.* iii. 1880, p. 496; *Jord. & Gilb. Syn. Fish. N. A.* p. 522 (1882).
Alvarius prœliaris, *Jord. Rep. U.S. Fish Comm.* 1885, p. 869.
Etheostoma prœliare, *Gilb. Proc. U.S. Nat. Mus.* x. 1887, p. 64.

D. VIII, 11. A. I 6. Sc. 36; l. l. 2.

Depth of body 4 times in total length, length of head 4 times. Snout pointed, longer than eye; eye ¼ length of head; jaws equal; maxillary extending to below anterior border of eye; cheeks and opercles covered with large scales; opercular spine well developed. The two portions of the dorsal well separated and equal in length. Anal about ⅓ length of soft dorsal. Greenish olive, speckled with

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brown; about ten oblong brown spots along the side; a black streak in front of and another below the eye; dorsal fins somewhat barred.

Total length 40 millim.

Corinth, Eastern Mississippi.

### 45. Etheostoma fonticola.

Etheostoma (Alvarius) fonticola, *Jord. & Gilb. Proc. U.S. Nat. Mus.* x. 1887, p. 63; *Everm. & Kend. Bull. U.S. Fish Comm. f.* 1892, p. 115, pl. xxxvi. (1894).

D. VI–VII, 8–10. A. I 7. Sc. 34; l.l. 1–2.

Depth of body 4½ to 5 times in total length, length of head 3⅝ to 3¾ times. Snout as long as or shorter than eye; latter much longer than interorbital width, 3½ to 4 times in length of head; mouth terminal, oblique, lower jaw slightly included; maxillary reaching to below pupil; cheeks naked; opercles scaly; opercular spine well developed; gill-membranes moderately joined across isthmus, uniting in an acute angle. The two portions of the dorsal small and well separated. Anal spine strong. Pectoral shorter than head. Lateral line reduced to one or two pores near the head; breast naked. Olivaceous; dorsal region with fine dark specks and about 8 indistinct dusky cross-blotches; a series of horizontal stich-like dark lines along middle of side, forming an interrupted lateral streak; three small dark spots at base of tail; a dark spot on opercle; a dark bar before, one below, and one behind the eye; soft parts of vertical fins with light and dark bars; lower half of spinous dorsal jet-black; above this a broad red band, the fin narrowly edged above with black.

Total length 38 millim.

Texas.

The following species, which probably belongs to the present genus, is too incompletely described, and has not been recognized since its original description:—

ETHEOSTOMA TESSELLATUM.

Etheostoma tessellata, *Storer, Proc. Bost. Soc. N. H.* ii. 1845, p. 48.
Nothonotus? tessellatus, *Jord. & Gilb. Syn. Fish. N. A.* p. 509 (1882).

D. XII, 13. A. II 10.

Florence, Alabama.

## 5. BOLEOSOMA.

Boleosoma, *De Kay, N. York Faun., Fish.* p. 20 (1842); *Agass. Am. Journ. Sc.* xvii. 1854, p. 306; *Jord. & Gilb. Syn. Fish. N. Am.* p. 491 (1882).

Boleosoma, part., *Agass. Lake Superior*, p. 299 (1850); *Günth. Cat.* i. p. 77 (1859); *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 210; *Vaill. N. Arch. Mus.* ix. 1873, p. 73.

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Arlina, *Girard, Proc. Ac. Philad.* 1859, p. 65.
Estrella, *Girard, l. c.* p. 66.
Cottogaster, *Putnam, Bull. Mus. Comp. Zool.* i. 1863, p. 4; *Jord. & Gilb. l. c.* p. 497.
Cottogaster, part., *Cope, l. c.* p. 210.
Rheocrypta, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 9.
Imostoma, *Jord. Proc. Ac. Philad.* 1877, p. 49; *Jord. & Gilb. l. c.* p. 498.
Vaillantia, *Jord. Bull. U.S. Nat. Mus.* no. 12, 1878, p. 89; *Jord. & Gilb. l. c.* p. 493.
Etheostoma, part., *Gilbert, Proc. U.S. Nat. Mus.* x. 1887, p. 47; *Jord. Man. Vert. N. U. S.* 5th ed. p. 121 (1888).

Body more or less compressed; scales small, denticulated; lateral line present, complete or incomplete, the tube occupying nearly the whole length of the scale. Mouth small; præmaxillaries protractile; maxillary small, exposed, its upper border slipping under the præorbital; villiform teeth in jaws and on vomer. Head naked or partly scaly; præopercle entire; opercle ending in a spine; gill-membranes more or less connected across isthmus; six branchiostegals; pseudobranchiæ small or rudimentary; gill-rakers short. Two dorsals, with VIII–XII, 10–15 rays. Anal short, with I–II 7–12 rays. Caudal truncate or rounded. Pectorals symmetrical, obtusely pointed, rays 13–14. Ventrals behind the base of the pectorals, separated by an interspace nearly equal to the width of their base; spine feeble. Vertebræ 37–38 (15–18 + 20–22).

North America east of the Rocky Mountains.

*Synopsis of the Species.*

I. Two anal spines; anal fin nearly as long as soft dorsal.

D. X–XII, 10–12; belly with a series of enlarged caducous scales ..... 1. *copelandii*, p. 91.
D. IX–XI, 13–15 ..... 2. *shumardii*, p. 92.

II. A single anal spine; anal fin very short.

A. Lateral line complete or nearly so.

1. Pectorals about as long as head.

Opercles scaly; depth of body 5 to 6 times in total length ..... 3. *nigrum*, p. 93.
Head entirely naked; depth of body 6⅓ times in total length ..... 4. *susanæ*, p. 94.

2. Pectorals 1⅓ to 1½ as long as head.

Snout shorter than eye, profile rounded; mouth small, inferior ..... 5. *podostemone*, p. 95.
Snout about as long as eye, profile steep and nearly straight ..... 6. *longimanus*, p. 95.

B. Lateral line ceasing near middle of body 7. *camurum*, p. 96.

## 1. Boleosoma copelandii.

Cottogaster tessellatus (*non DeKay*), *Putnam, Bull. Mus. Comp. Zool.* i. 1863, p. 5.
Rheocrypta copelandi, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 9.

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Cottogaster copelandi, *Jord. & Gilb. Syn. Fish. N. A.* p. 498 (1882).
Cottogaster putnami, *Jord. & Gilb. l. c.*
Etheostoma copelandi, *Jord. Man. Vert. N. U. S.* 5th ed. p. 125 (1888); *Gilb. Bull. U.S. Fish Comm.* ix. 1891, p. 155; *Woolman, Bull. U.S. Fish Comm.* x. 1892, p. 259.
Etheostoma putnami, *Jord. l. c.*

D. X–XII, 10–12. A. II 8–9. Sc. 44–56 $\frac{6}{8}$.

Body rather feebly compressed; depth of body $5\frac{1}{2}$ to $6\frac{1}{3}$ times in the total length, length of head $3\frac{3}{4}$ to $4\frac{1}{4}$ times. Snout as long as eye, very convex in profile; diameter of eye $3\frac{1}{3}$ to $3\frac{2}{3}$ times in length of head, at least double interorbital width; mouth small, somewhat inferior; maxillary extending to below anterior border of eye or a little beyond; cheeks naked; opercles naked or with a few scales; opercular spine strong; distance between mouth and gill-cleft (measured on median line) about three fifths length of head. Soft dorsal shorter and deeper than the spinous. Anal nearly as long as soft dorsal; first spine stronger than second. Pectoral as long as head. Lateral line complete; breast naked; belly with a median series of enlarged, caducous scales. Pale olive, with or without dark dots; a series of longitudinal dark blotches along lateral line; a dark streak in front of eye; first dorsal and ventrals blackish in the male.

Total length 50 millim.

From the Great Lakes to Arkansas and Alabama.

| | | | |
|---|---|---|---|
| *a–b.* Ad. | White R., Indiana. | Prof. D. S. Jordan. (Two of the types of *R. copelandi.*) |
| *c–e.* Ad. | Gosport, Indiana. | Prof. Eigenmann [C.]. |

### 2. Boleosoma shumardii.

Hadropterus shumardi, *Gir. Proc. Ac. Philad.* 1859, p. 100.
Etheostoma shumardii, *Jord. & Copel. Bull. Buff. Soc. N. Sc.* 1876, p. 164; *Jord. Bull. U.S. Fish Comm.* viii. 1889, p. 164; *Everm. & Kend. Bull. U.S. Fish Comm. f.* 1892, pl. xxxvi. (1894).
Imostoma shumardii, *Jord. Proc. Ac. Philad.* 1877, p. 49; *Jord. & Gilb. Syn. Fish. N. A.* p. 498 (1882).
Cottogaster shumardi, *Jord. Rep. U.S. Fish Comm.* 1885, p. 867.
Etheostoma (Cottogaster) uranidea, *Jord. & Gilb. Proc. U.S. Nat. Mus.* x. 1887, p. 48, *and Bull. U.S. Fish Comm.* viii. 1889, p. 164.
Etheostoma wrighti, *McCormick, Bull. Oberlin Coll. Lab.* no. 2, 1892, p. 30.

D. IX–XI, 13–15. A. II 10–12. Sc. 48–60 $\frac{6-7}{10-11}$.

Body moderately compressed; depth of body 5 to $5\frac{2}{3}$ times in total length, length of head $3\frac{1}{2}$ to 4 times. Snout as long as eye, profile gently curved; diameter of eye $3\frac{1}{2}$ to $3\frac{3}{4}$ times in length of head, about $1\frac{1}{2}$ interorbital width; mouth terminal, slightly oblique; maxillary extending to below anterior border of eye or a little beyond; cheeks naked or scaly; opercles scaly; opercular spine strong; distance between mouth and gill-cleft (measured on median

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line) about $\frac{2}{3}$ length of head. Soft dorsal a little shorter and deeper than the spinous. Anal as long as soft dorsal; first spine stronger and a little longer than second. Pectoral nearly as long as head. Lateral line complete; breast naked, or with a few scattered scales. Olive; a lateral series of 10 to 12 more or less distinct dark vertical blotches below the lateral line; a dark bar below the eye; fins with dark bars.

Total length 55 millim.

Michigan to Arkansas.

| | | |
|---|---|---|
| *a-b*. Ad. & yg. | Goguac Lake, Michigan. | U.S. Fish Commission. |
| *c*. Ad. | Wabash R., Indiana. | Prof. D. S. Jordan. |
| *d*. Ad. | Wabash R., Indiana. | Smithsonian Institution. |

### 3. Boleosoma nigrum.

Etheostoma nigra, *Rafin. Ichth. Oh.* p. 37 (1820); *Jord. Bull. U.S. Fish Comm.* viii. 1889, pp. 104, 112, 130; *Eigenmann, Am. Nat.* 1892, p. 962.

Etheostoma olmstedi, *Storer, Bost. Journ. N. H.* iv. 1842, p. 61, pl. v. fig. 2.

Boleosoma tessellatum, *De Kay, N. Y. Faun., Fish.* p. 20, pl. xx. fig. 57 (1842); *Günth.* i. p. 77 (1859).

Etheostoma maculatum, *Agass. Lake Super.* p. 305, pl. iv. fig. 3 (1850); *Günth. l. c.*

Arlina effulgens, *Gir. Proc. Ac. Philad.* 1859, p. 65.

Estrella atromaculata, *Gir. l. c.* p. 66.

? Pœcilichthys mescœus, *Cope, Proc. Ac. Philad.* 1864, p. 232.

Boleosoma olmstedi, *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 213; *Vaill. N. Arch. Mus.* ix. 1873, p. 79, pl. ii. fig. 6; *Jord. & Gilb. Syn. Fish. N. A.* p. 492 (1882).

Boleosoma effulgens, *Cope, Proc. Am. Philos. Soc.* xi. 1870, p. 268; *Jord. & Gilb. l. c.* p. 493.

Boleosoma maculaticeps, *Cope, l. c.*

Boleosoma brevipinne, *Cope, l. c.*

Boleosoma æsopus, *Cope, l. c.*; *Jord. & Gilb. l. c.*

Boleosoma mutatum, *Vaill. l. c.* p. 88.

Boleosoma vexillare, *Jord. Proc. U.S. Nat. Mus.* ii. 1880, p. 235; *Jord. & Gilb. l. c.* p. 493.

Boleosoma nigrum, *Jord. & Gilb. l. c.* p. 492.

D. VIII–X, 10–14. A. I 7–9. Sc. 35–55 $\frac{4-5}{6-10}$.

Body rather feebly compressed; depth of body 5 to 6 times in total length, length of head $3\frac{3}{4}$ to $4\frac{1}{2}$ times. Profile of snout curved; diameter of eye equal to or a little greater than length of snout, about twice interorbital width, $3\frac{2}{3}$ to 4 times in length of head; mouth small, inferior; maxillary extending to below anterior border of eye or a little beyond; cheeks naked or scaly; opercles scaly; opercular spine strong; the distance between mouth and gill-cleft (measured on the median line) about half length of head. The two portions of the dorsal subequal in depth, the spinous usually a little longer than the soft. Anal much shorter than dorsals; spine short and weak. Pectoral about as long as head. Caudal truncate. Lateral line complete or wanting on a few of

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the hinder scales; breast usually naked. Olivaceous or yellowish brown, with small dark brown spots; usually a dorsal and a lateral series of larger spots, or a series of dark vertical bars; a dark streak in front of the eye; usually a dark spot or vertical streak below eye; males in spring sometimes partly or entirely black, and with the dorsals blackish with light spots; dorsals and caudal otherwise pale, dark-spotted.

Total length 85 millim.

North America east of the Rocky Mountains, from Canada and Massachusetts to Louisiana and Georgia.

| | | |
|---|---|---|
| *a–f*. Ad. & hgr. | Fort Qu'Appelle, Assiniboia. | Prof. Eigenmann [C.] |
| *g–k*. Ad., hgr., & yg. | Brandon, Manitoba. | Prof. Eigenmann [C.]. |
| *l–s*. Ad., hgr., & yg. | Westbourne, Manitoba. | Prof. Eigenmann [C.]. |
| *t*. Ad. | Montreal. | |
| *u–y*. Ad. & hgr. | Goose R., Hillsboro', N. Dacota. | Prof. Eigenmann [C.]. |
| *z*. Ad. | Valley City, N. Dacota. | Prof. Eigenmann [C.]. |
| *a–γ*. Ad. & hgr. | Minnesota R., Ortonsville, Minnesota. | Prof. Eigenmann [C.]. |
| *δ*. Ad. | Appleton, Minnesota. | Prof. Eigenmann [C.]. |
| *ε–θ*. Ad. | Bloomington, Indiana. | Prof. D. S. Jordan. |
| *ι–κ, λ–μ*. Ad. | White River, Indiana. | Prof. D. S. Jordan. |
| *ν–σ*. Ad. & hgr. | Gosport, Indiana. | Prof. Eigenmann [C.]. |
| *τ–φ*. Ad. & hgr. | Yellow R., Plymouth, Indiana. | U.S. Fish Commission. |
| *χ, ψ*. Many specs. | Cedar Bluffs, Monroe Co., Indiana. | Prof. Eigenmann [C.]. |
| *ω–aa*. Ad. | Susquehanna River, Pennsylvania. | Smithsonian Instit. |
| *bb–dd*. Hgr. | Allemanee Creek, Greensboro', N. Carolina. | U.S. Fish Commission. |
| *ee–ff*. Ad. | Dismal Swamp, Suffolk, Virginia. | U.S. Fish Commission. |
| *gg*. Hgr. | Shenandoah R., Luray, Virginia. | U.S. Fish Commission. |

### 4. Boleosoma susanæ.

Boleosoma susanæ, *Jord. & Swain, Proc. U.S. Nat. Mus.* iv. 1883, p. 249.

Etheostoma susanæ, *Jord. Man. Vert. N. U.S.* 5th ed. p. 124 (1888).

D. VIII, 10–11. A. I 8. Sc. 45–50 $\frac{4}{6}$.

Body very slender, little compressed; depth of body 6½ times in total length, length of head 4⅓ times. Snout short, bluntly decurved; eye a little longer than snout; mouth small, inferior; maxillary extending to below anterior third of eye; head entirely naked. Dorsal short and low. Pectoral nearly as long as head. Scales large; lateral line wanting on the last three or four scales. Colour as in *B. nigrum*, the males with the head and fins jet-black, and the body blackish olive barred with black. Females

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light olive, tessellated with darker, and with dusky spots along the lateral line; a dark spot before eye and one on back before dorsal; lower fins pale; both dorsals and caudal with darker bars.

Total length 50 millim.

Cumberland River, Kentucky.

| | | |
|---|---|---|
| *a*. Hgr. | Williamsburg. | Prof. Eigenmann. |

### 5. Boleosoma podostemone.

Etheostoma podostemone, *Jord. & Jenk. Proc. U.S. Nat. Mus.* xi. 1888, p. 359, pl. xlv. fig. 11.

D. VIII–X, 13. A. I 8. Sc. 35–40 $\frac{4}{7}$.

Body rather strongly compressed; depth of body $5\frac{1}{2}$ to $5\frac{2}{3}$ times in total length, length of head $4\frac{1}{3}$ to $4\frac{2}{5}$ times. Profile of snout rounded; eye a little longer than snout, $3\frac{1}{2}$ to $3\frac{3}{4}$ times in length of head, twice interorbital width; mouth small, inferior; maxillary extending to below anterior border of eye; cheeks naked; opercles with a few scales; gill-membranes rather broadly united, the distance between their median point and the mouth about $\frac{3}{5}$ length of head. The two portions of the dorsal well separated, the spinous slightly longer than and nearly as deep as the soft. Anal short; spine short. Pectoral $1\frac{1}{3}$ as long as head. Caudal rounded. Lateral line complete; breast and anterior part of belly naked. Yellowish, with small blackish spots; a black streak on each side of the head, passing through the eye; a brown vertical bar below the eye; dorsals, pectorals, and caudal with dark bars.

Total length 52 millim.

Roanoke River, James River, and Alleghany Springs, Virginia.

| | | |
|---|---|---|
| *a*. Ad. | Roanoke R. | U.S. Fish Commission. (One of the types.) |
| *b–c*. Ad. & hgr. | James R. | Prof. Eigenmann. |

### 6. Boleosoma longimanus.

Etheostoma longimane, *Jord. Proc. Ac. Philad.* 1888, p. 179, *and Proc. U.S. Nat. Mus.* xi. 1888, p. 361, pl. xlv. fig. 14.

D. X, 13. A. I 8. Sc. 44 $\frac{5}{7}$.

Body not much compressed; depth of body 5 times in total length, length of head $4\frac{2}{5}$ times. Profile of snout steep and nearly straight; eye about as long as snout, $\frac{1}{4}$ length of head; lower jaw included; maxillary reaching to below anterior border of eye; cheeks naked; opercles with some scales; gill-membranes a little connected. Soft portion of dorsal nearly as long as and deeper than the spinous. Anal short and deep; spine short. Pectoral very long, $1\frac{1}{2}$ as long as head. Caudal lunate. Lateral line complete; breast naked; belly naked anteriorly. Straw-colour, many scales on the back darker; ten dark spots on side, rather irregular and

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small, one at base of caudal and one on front of opercle; a stripe in front of eye, and a very faint dark shade below eye; both dorsals with dark spots; caudal and pectorals somewhat barred.

Total length 65 millim.

James River, Virginia.

### 7. Boleosoma camurum.

Boleosoma camura, *Forbes, Bull. Illin. Lab. N. H.* ii. 1878, p. 40.
Vaillantia chlorosoma, *Hay, Proc. U.S. Nat. Mus.* iii. 1880, p. 495; *Jord. & Gilb. Syn. Fish. N. A.* p. 494 (1882).
Vaillantia camura, *Jord. & Gilb. l. c.* & p. 971.
Etheostoma chlorosoma, *Jord. Man. Vert. N. U.S.* 5th ed. p. 124 (1888); *Everm. & Kend. Bull. U.S. Fish Comm.* xii. 1894, p. 113, pl. xxxiv.
Etheostoma camurum, *Woolman, Bull. U.S. Fish Comm.* x. 1892, p. 260.

D. IX–X, 10–11. A. I 7–8. Sc. 50–65 $\frac{5-6}{10-12}$; l. l. 4–30.

Body moderately compressed; depth of body 5½ to 6½ times in the total length, length of head 4 to 4½ times. Snout short, very strongly decurved; diameter of eye somewhat exceeding length of snout, nearly twice interorbital width, about ⅓ length of head; mouth small, inferior; maxillary reaching to below anterior third of eye; cheeks and opercles scaled; opercular spine strong; distance between mouth and gill-cleft (measured on median line) about ⅔ length of head. Dorsal small, the two portions well apart, first longer than second. Anal shorter than soft dorsal. Pectoral as long as head. Lateral line incomplete; breast naked or scaly. Olivaceous, back spotted with darker; about ten dark spots on the side; a dark opercular spot; dorsals and caudal barred.

Total length 45 millim.

Illinois to Alabama, Arkansas, and Texas.

| | | |
|---|---|---|
| *a*. Ad. | Tuscumbia R., Mississippi. | Smithsonian Instit. |
| *b*. Ad. | Wabash R., New Harmony, Indiana. | U.S. Fish Commission. |

### 6. ULOCENTRA.

Hyostoma, part., *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 210; *Vaill. N. Arch. Mus.* ix. 1873, p. 98.
Ulocentra, *Jord. Man. Vert. N. U.S.* 2nd ed. p. 223 (1878); *Jord. & Gilb. Syn. Fish. N. A.* p. 494 (1882).
Etheostoma, part., *Gilbert, Proc. U.S. Nat. Mus.* x. 1887, p. 47; *Jord. Man. Vert. N. U.S.* 5th ed. p. 121 (1888).

Body more or less compressed; scales small, denticulated; lateral line present, complete or incomplete, the tube straight, occupying nearly the whole length of the scale. Mouth small; præmaxillaries protractile; maxillary small, exposed, its upper border slipping under the præorbital; villiform teeth in jaws and on vomer. Head naked or partly scaly; præopercle entire; opercle ending in a

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spine; gill-membranes separated or more or less connected across isthmus; six branchiostegals; pseudobranchiæ small; gill-rakers short. Two dorsals, with IX–XIII, 10–13 rays. Anal short, with II 5–9 rays. Caudal truncate or rounded, or slightly emarginate. Pectorals symmetrical, obtusely pointed, rays 14–15. Ventrals behind the base of the pectorals, narrowly separated from each other; spine feeble. Vertebræ 38 (15 + 23).

United States east of the Rocky Mountains.

*Synopsis of the Species.*

I. Lateral line complete or nearly so; gill-membranes broadly united across isthmus.

A. Spinous dorsal longer than the soft.

Pectoral longer than head; opercles scaled ..... 1. *simotera*, p. 97.
Pectoral as long as head, which is entirely naked.. 2. *verecunda*, p. 98.

B. Spinous and soft dorsals nearly equal in length; pectoral longer than head ..... 3. *histrio*, p. 98.

II. Lateral line ceasing below soft dorsal; gill-membranes narrowly connected.

A. II 7–9; opercles scaly ..... 4. *stigmæa*, p. 99.
A. II 6; cheeks and opercles scaly ..... 5. *davisonii*, p. 99.
A. II 5; cheeks and opercles naked ..... 6. *phlox*, p. 99.

## 1. Ulocentra simotera.

Hyostoma simoterum, *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 215, pl. xxiv. fig. 5; *Vaill. N. Arch. Mus.* ix. 1873, p. 100, pl. iii. fig. 3.
Arlina atripinnis, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 10.
Diplesium simoterum, *Jord. Man. Vert. N. U.S.* 2nd ed. p. 223 (1878), *and Rep. U.S. Fish Comm.* 1885, p. 866.
Ulocentra atripinnis, *Jord. & Gilb. Syn. Fish. N. A.* p. 495 (1882).
Ulocentra simotera, *Jord. & Gilb. l. c.* p. 496.
Etheostoma simoterum, *Jord. Man. Vert. N. U.S.* 5th ed. p. 125 (1888).

D. X–XII, 10–11. A. II 7. Sc. 48–52 $\frac{5-6}{10-12}$.

Depth of body 4 to 5 times in total length, length of head 4 to $4\frac{2}{3}$ times. Snout very short, with strongly-curved profile; diameter of eye $3\frac{1}{2}$ times in length of head, $1\frac{1}{3}$ interorbital width; mouth small, horizontal, subinferior; maxillary reaching to below anterior border of eye or a little beyond; cheeks and opercles scaled; opercular spine strong; distance between mouth and gill-cleft (measured on middle line) $\frac{2}{3}$ length of head. The two portions of the dorsal narrowly separated, subequal in depth, the spinous considerably longer than the soft. Anal shorter than soft dorsal; spines well developed, first stronger and a little longer than second. Pectoral a little longer than head. Caudal slightly emarginate. Lateral line complete; breast naked or scaly. Olivaceous; a dorsal and a lateral series of large blackish blotches; the latter may be divided by a light line running along the lateral line; a vertical



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dark streak below the eye sometimes present; dorsal and caudal fins with dark bars.

Total length 70 millim.

Tennessee and Cumberland Basins.

| | | |
|---|---|---|
| *a*. Ad. | South Fork, Holston R. | U.S. Fish Commission. |
| *b*. Ad. | Holston R. | Prof. E. D. Cope [C.]. |

### 2. Ulocentra verecunda.

Etheostoma verecundum, *Jord. & Everm. Proc. U.S. Nat. Mus.* xi. 1888, p. 360, pl. xlv. fig. 12.

D. XI, 11. A. II 7. Sc. 47 $\frac{6}{9}$.

Body subfusiform, little compressed; depth of body and length of head equal, $4\frac{1}{2}$ times in total length. Snout short, very convex in profile; eye longer than snout, $3\frac{1}{4}$ times in length of head; mouth small, inferior, horizontal; maxillary extending to below anterior border of eye; head entirely naked; gill-membranes broadly united. The two portions of the dorsal scarcely joined, the soft shorter and a little deeper than the spinous. Pectoral as long as head. Caudal rounded. Lateral line complete; breast naked. Greenish yellow, much mottled with darker green; six or seven distinct quadrate green spots along lateral line; a dark bar below and before eye; top of head dark; dorsals and caudal barred with dark olive; spinous dorsal with orange spots.

Total length 55 millim.

Holston River, Virginia.

### 3. Ulocentra histrio.

Etheostoma (Ulocentra) histrio, *Jord. & Gilb. Proc. U.S. Nat. Mus.* x. 1887, p. 47; *Woolman, Bull. U.S. Fish Comm.* x. 1892, p. 253.

D. IX–X, 12–13. A. II 7. Sc. 50–54 $\frac{5}{11}$.

Depth of body 5 to $5\frac{1}{2}$ times in total length, length of head 4 to $4\frac{1}{4}$ times. Profile of snout strongly curved; diameter of eye much greater than length of snout, twice interorbital width, $\frac{1}{3}$ length of head; mouth small, horizontal, subinferior; maxillary reaching to below anterior third of eye; head naked, or with a few scales on opercles; opercular spine strong; gill-membranes broadly joined across isthmus. Dorsal small, the two portions separate, nearly equal in length and depth. First anal spine longer and stronger than second. Pectoral much longer than head. Caudal emarginate. Lateral line complete; breast naked. Body very dark green; back with 7 light cross-bars usually very distinct; a broad dark bar from eye to tip of snout, one below eye, and a broad dusky area covering parts of opercle, præopercle, and cheek; a dark bar in front of pectoral; fins all conspicuously marked with broad bars of light and dusky greenish; a black humeral spot.

Total length 45 millim.

Arkansas, Kentucky, Indiana.

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### 4. Ulocentra stigmæa.

Boleosoma stigmæum, *Jord. Ann. Lyc. N. H. N.Y.* 1876, p. 311.
Pœcilichthys saxatilis, *Hay, Proc. U.S. Nat. Mus.* iii. 1880, p. 495; *Jord. & Gilb. Syn. Fish. N. A.* p. 515 (1882).
Ulocentra stigmæa, *Jord. & Gilb. l. c.* p. 495.
Etheostoma saxatile, *Jord. Rep. U.S. Fish Comm.* 1885, p. 868.
Etheostoma stigmæum, *Gilb. Bull. U.S. Fish Comm.* ix. 1891, p. 150.

D. X–XIII, 10–12. A. II 7–9. Sc. 46–55 $\frac{5}{10}$; l. l. 35.

Depth of body 5 times in total length, length of head 4 to $4\frac{1}{3}$ times. Diameter of eye equal to length of snout, 4 times in length of head; mouth horizontal, terminal; maxillary extending to below anterior border or anterior third of eye; cheeks naked or scaly; opercles scaly; gill-membranes narrowly connected. Spinous portion of dorsal longer than the soft and rather widely separated from it. Anal shorter than soft dorsal. Caudal emarginate. Lateral line extending as far back as the posterior rays of the soft dorsal; breast naked. Yellowish olive above, with 6 square brown spots; sides with W-shaped black spots and specks of brown arranged in zigzag lines; a black streak before eye and another below it; dorsal and caudal fins barred with dusky.

Total length 45 millim.

Tennessee and Georgia to Louisiana and Arkansas.

*a*. Ad. Etowah R., Georgia. Smithsonian Institution.

### 5. Ulocentra davisonii.

Etheostoma davisoni, *Hay, Proc. U.S. Nat. Mus.* viii. 1885, p. 554.

D. IX, 10. A. II 6. Sc. 50 $\frac{5}{7}$; l. l. 30.

Depth of body $6\frac{1}{2}$ times in total length, length of head $4\frac{1}{5}$ times. Snout rather pointed, not strongly decurved, shorter than the eye; latter $\frac{1}{3}$ length of head; mouth large, horizontal, terminal; maxillary extending to below anterior third of eye; interorbital space narrow; cheeks and opercles densely scaled; opercular spine well developed; gill-membranes narrowly connected. The two portions of the dorsal well separated, anterior longest. Anal spines well developed, first rather stronger. Olivaceous; many of the scales with a dark blotch, which blotches unite to form zigzag and W-shaped markings, especially above the lateral line; about 10 larger nearly square spots along the side; a black streak downward from the eye and another forward to the snout; fins dusky; both dorsals with a row of dusky spots lying between the rays; caudal barred.

Yellow River, Florida.

### 6. Ulocentra phlox.

Boleosoma phlox, *Cope, Bull. U.S. Nat. Mus.* no. 17, 1880, p. 30.
Ulocentra phlox, *Jord. & Gilb. Syn. Fish. N. A.* p. 495 (1882).

D. X, 12. A. II 5. Sc. 52 $\frac{5}{8}$.

Body rather stout; mouth terminal; cheeks and opercles naked;



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opercular spine strong. The two portions of the dorsal narrowly separated. Anal spines well developed, first stouter and a little longer than second. Lateral line not extending beyond middle of second dorsal fin. Vermilion-red, with faint small brown dorsal spots; a series of small blue spots along the lateral line; spinous dorsal with a dark blue border; second dorsal with a dark shade; caudal cross-barred.

Total length 50 millim.

Trinity River, Texas.

## 7. DIPLESIUM.

Etheostoma, part., *Rafin. Journ. de Phys.* lxxxviii. 1819, p. 419; *Gilbert, Proc. U.S. Nat. Mus.* x. 1887, p. 47; *Jordan, Man. Vert. N. U. S.* 5th ed. p. 121 (1888).

Diplesion, *Rafin. Ichth. Oh.* p. 37 (1820); *Jord. & Gilb. Syn. Fish. N. A.* p. 496 (1882).

Hyostoma, *Agass. Am. Journ. Sc.* (2) xvii. 1854, p. 305.

Hyostoma, part., *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 210; *Vaill. N. Arch. Mus.* ix. 1873, p. 98.

Body more or less compressed; scales small, denticulated; lateral line complete, the tube straight, not extending to the extremity of the scale. Mouth small; præmaxillaries protractile, or joined to the forehead by a narrow median frenum; maxillary immovable, adnate to the præorbital; villiform teeth in jaws; palate toothless. Head partly scaly; præopercle entire; opercle ending in a spine; gill-membranes broadly connected across isthmus; six branchiostegals; pseudobranchiæ absent; gill-rakers very short. Two dorsals, with XII–XIV, 12–15 rays. Anal short, with II 8–9 rays. Caudal emarginate. Pectorals symmetrical, rounded, rays 15. Ventrals behind the base of the pectorals, narrowly separated from each other; spine feeble. Vertebræ 42 (19+23).

United States east of the Rocky Mountains.

### 1. Diplesium blennioides.

Etheostoma blennioides, *Rafin. Journ. de Phys.* lxxxviii. 1819, p. 419; *Woolman, Bull. U.S. Fish Comm.* x. 1892, p. 284.

Pileoma cymatogramma, *Abbott, Proc. Ac. Philad.* 1860, p. 327.

Hyostoma newmani, *Agass. Am. Journ. Sc.* (2) xvii. 1854, p. 305.

Hyostoma cymatogrammum, *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 214; *Vaill. N. Arch. Mus.* ix. 1873, p. 102, pl. iii. fig. 2.

Hyostoma blennioperca, *Cope, l. c.*; *Vaill. l. c.* p. 105.

Diplesium blennioides, *Jord. Bull. U.S. Nat. Mus.* no. 9, 1877, p. 23; *Jord. & Gilb. Syn. Fish. N. A.* p. 497 (1882).

Diplesium newmani, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 15.

D. XII–XIV, 12–15. A. II 8–9. Sc. 58–78 $\frac{6-7}{10-15}$.

Depth of body $4\frac{3}{4}$ to 6 times in total length, length of head $4\frac{1}{3}$ to $4\frac{2}{3}$ times. Snout short, very convex in profile; diameter of eye $3\frac{1}{2}$ to $3\frac{2}{3}$ times in length of head; interorbital space narrow; mouth small, inferior, extending hardly to below anterior border of eye; cheeks naked or scaly; opercles scaly; opercular spine strong; the distance between the mouth and the gill-cleft (measured on the

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median line) about $\frac{2}{3}$ the length of the head. The two portions of the dorsal subcontinuous, the soft one half shorter but a little deeper than the spinous. Anal short. Pectoral longer than head. Caudal emarginate. Lateral line complete; breast naked. Olive above, mottled with darker; a series of large dark M- or Y-shaped markings below the lateral line; fins blue-green, marked with orange-red; a more or less distinct dark bar below the eye.

Total length 95 millim.

Pennsylvania and Indiana to Alabama and Kansas.

| | | |
|---|---|---|
| *a, b.* Ad. | Black R., Ohio. | Smithsonian Instit. |
| *c–d.* Ad. | White R., Indiana. | Prof. D. S. Jordan. |
| *e–f.* Ad. & hgr. | Camden, Indiana. | U.S. Fish Commission. |
| *g.* Ad. | Wabash R., Indiana. | U.S. Fish Commission. |
| *h–k.* Ad. | Bean Blossom Creek, Monroe Co., Indiana. | Prof. Eigenmann [C.]. |
| *l–m.* Ad. | Gosport, Indiana. | Prof. Eigenmann [C.]. |
| *n, o.* Ad. | Holston River, Virginia. | Prof. E. D. Cope [C.]. |
| *p–q.* Ad. | Pensacola, Florida. | Prof. D. S. Jordan. |

## 8. AMMOCRYPTA.

Pleurolepis (*non Egert.*), *Agass. in Putnam, Bull. Mus. Comp. Zool.* i. 1863, p. 5; *Cope, Journ. Ac. Philad.* (2) vi. 1869, p. 210; *Vaill. N. Arch. Mus.* ix. 1873, p. 137.

Ammocrypta, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 5; *Jord. & Gilb. Syn. Fish. N. A.* p. 488 (1882).

Ioa, *Jord. & Brayt. Bull. U.S. Nat. Mus.* no. 12, 1878, p. 88; *Jord. & Gilb. l. c.* p. 490.

Etheostoma, part., *Gilb. Proc. U.S. Nat. Mus.* x. 1887, p. 47; *Jord. Man. Vert. N. U.S.* 5th ed. p. 121 (1888).

Body slender and elongate, cylindrical or somewhat depressed, pellucid in life; scales very thin, denticulated, sometimes wanting on back and belly; lateral line complete, the tube straight and occupying nearly the whole length of the scale. Mouth rather narrow, subterminal; præmaxillaries very protractile; maxillary small, exposed, its upper border slipping under the præorbital; villiform teeth in jaws and on vomer. Head naked or partly scaly; præopercle entire; opercle ending in an obtuse, indistinct point; gill-membranes united in front; six branchiostegals; pseudobranchiæ absent; gill-rakers very short. Two well-separated dorsal fins, subequal in extent, with VIII–XI, 9–14 rays. Anal short, with I–II 6–10 rays; spines very feeble. Caudal emarginate. Pectorals symmetrical, pointed, rays 12 to 15. Ventrals behind the base of the pectorals, separated by an interspace equal to the width of their base; spine feeble. Vertebræ 44 (23+21).

United States east of the Rocky Mountains.

### *Synopsis of the Species.*

I. Two anal spines; lat. l. 50–62.

Anal II 6–9; cheeks and opercles scaly..... 1. *vitrea*, p. 102.
Anal II 10; head entirely naked ..... 2. *vigilis*, p. 102.

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II. A single anal spine; lat. l. 65–78.

Cheeks and opercles scaly ..... 3. *pellucida*, p. 102.
Head entirely naked ..... 4. *beanii*, p. 103.

### 1. Ammocrypta vitrea.

Pœcilichthys vitreus, *Cope, Proc. Am. Philos. Soc.* xi. 1870, p. 263.
Ioa vitrea, *Jord. & Gilb. Syn. Fish. N. A.* p. 490 (1882).
Etheostoma vitreum, *Jord. Man. Vert. N. U.S.* 5th ed. p. 123 (1888).

D. VIII–IX, 11–14. A. II 6–9. L. l. 50–62.

Depth of body 7 to 7½ times in total length, length of head 4 to 4½ times. Diameter of eye nearly equal to length of snout, 3⅔ times in length of head; interorbital space very narrow; maxillary reaching to below anterior border of eye; cheeks and opercles scaly; distance between mouth and gill-cleft (measured on median line) about ⅔ length of head. Both portions of dorsal equal in length, the soft deeper. Anal shorter than soft dorsal. Pectoral longer than head. Translucent, with small black spots and dots; fins colourless.

Total length 55 millim.

North Carolina.

| | | |
|---|---|---|
| *a*. Ad. | Neuse River, N. Carolina. | Prof. D. S. Jordan. |
| *b–g*. Hgr. | Little River, Goldsboro', N. Carolina. | U.S. Fish Commission. |
| *h–i*. Ad. & hgr. | Tar River, Rocky Mountains, N. Carolina. | U.S. Fish Commission. |

### 2. Ammocrypta vigilis.

Ioa vigilis, *Hay, Bull. U.S. Fish Comm.* 1882, p. 59; *Jord. & Gilb. Syn. Fish. N. A.* p. 971 (1882).

D. X, 12. A. II 10. L. l. 60.

Depth of body 6 times in total length, length of head 3¾ times. Eye longer than snout, ⅓ length of head; maxillary reaching to below anterior third of eye; head entirely naked; opercular spine distinct. 10 quadrate black blotches along back and as many along lateral line; a small black spot at base of caudal.

Total length 35 millim.

Pearl River, Mississippi.

### 3. Ammocrypta pellucida.

Pleurolepis pellucidus, *Agass. in Putn. Bull. Mus. C. Z.* i. 1863, p. 5; *Vaill. N. Arch. Mus.* ix. 1873, p. 138, pl. i. fig. 4.
Ammocrypta vivax, *Hay, Bull. U.S. Fish Comm.* 1882, p. 58; *Jord. & Gilb. Syn. Fish. N. A.* p. 970 (1882).
Ammocrypta pellucida, *Jord. & Gilb. op. cit.* p. 489.
Ammocrypta clara, *Jord. & Meek, Proc. U.S. Nat. Mus.* viii. 1885, p. 8.
Etheostoma pellucidum, *Jord. Man. Vert. N. U.S.* 5th ed. p. 122 (1888).
Etheostoma pellucidum clarum, *Everm. & Kend. Bull. U.S. Fish Comm. f.* 1892, p. 118, pl. xxxiv. (1894).

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D. IX–XI, 9–11. A. I 8–10. L. l. 67–78.

Depth of body 7 to 8½ times in total length, length of head 4 to 4¾ times. Diameter of eye equal to or a little less than length of snout, 3⅔ to 4 times in length of head; interorbital space very narrow; maxillary reaching to below anterior border of eye; cheeks and opercles scaly; distance between mouth and gill-cleft (measured on median line) ⅔ to ¾ length of head. Spinous portion of dorsal longer than but not quite so deep as the soft. Anal shorter than second dorsal. Pectoral as long as head or a little shorter. Translucent; a series of blackish blotches along each side, connected by a silvery stripe; a dark streak from eye to end of snout; fins colourless.

Total length 70 millim.

N.E. Texas, Arkansas, Ohio Valley, and North-westward.

| | | |
|---|---|---|
| *a*. Several specs. | White River, Indiana. | Prof. D. S. Jordan. |
| *b–c*. Ad. | White River, Indiana. | Smithsonian Instit. |
| *d*. Several specs. | Gosport, Indiana. | Prof. Eigenmann [C.]. |
| *e–g*. Ad. | Indiana. | Paris Museum [E.]. |
| *h–k*. Ad. | Wabash R. | Prof. D. S. Jordan. |

### 4. Ammocrypta beanii.

Ammocrypta beanii, *Jord. Bull. U.S. Nat. Mus.* no. 10, 1877, p. 5; *Jord. & Gilb. Syn. Fish. N. A.* p. 489 (1882).
Ammocrypta gelida, *Hay, Proc. U.S. Nat. Mus.* iii. 1880, p. 490.

D. VIII–X, 10. A. I 9. L. l. 65.

Depth of body 7½ to 8 times in total length, length of head 3¾ to 4 times. Diameter of eye nearly equal to length of snout, 3⅔ times in length of head; interorbital space very narrow; maxillary reaching to below anterior border of eye; distance between mouth and gill-cleft (measured on the median line) about ⅔ length of head; head entirely naked. Body naked, except the caudal peduncle and a series of rather large scales along the side, on which the lateral line runs. Translucent, without spots, the lateral line golden; spinous dorsal with black spots.

Total length 55 millim.

Louisiana, Mississippi, Alabama.

| | | |
|---|---|---|
| *a*. Ad. | Little Escambia R., Pollard, Alabama. | Prof. Eigenmann. |

### 9. CRYSTALLARIA.

Crystallaria, *Jordan, Rep. U.S. Syn. Fish. Comm.* 1885, p. 866.
Etheostoma, part., *Gilbert, Proc. U.S. Nat. Mus.* x. 1887, p. 47; *Jordan, Man. Vert. N. U.S.* 5th ed. p. 121 (1888).

Body slender and elongate, subcylindrical, pellucid in life; scales small, rough; lateral line complete. Mouth small; præmaxillaries not protractile; maxillary small; villiform teeth in jaws and on vomer. Head partly scaly; præopercle entire; opercle ending in

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a spine; gill-membranes considerably united; six branchiostegals. Two dorsals, with XIV, 13 rays. Anal with I 12 rays. Caudal emarginate.

United States (Ohio and Mississippi Basins).

### 1. Crystallaria asprellus.

Pleurolepis asprellus, *Jord. Bull. Illin. Lab. N. H.* ii. 1878, p. 38.
Ammocrypta asprella, *Jord. & Gilb. Syn. Fish. N. A.* p. 490 (1882).
Crystallaria asprella, *Jord. Rep. U.S. Fish Comm.* 1885, p. 866.
Etheostoma asprellus, *Jord. Man. Vert. N. U.S.* 5th ed. p. 123 (1888), *and Bull. U.S. Fish Comm.* viii. 1889, p. 164.

D. XIV, 13. A. I 12. Sc. $98\frac{10}{-}$.

Depth of body 8 times in total length, length of head $4\frac{1}{5}$ times. Eyes large, high up and very close together; mouth subterminal, horizontal; cheeks and opercles scaly; opercular spine well developed. The two portions of the dorsal well separated, the spinous high, highest in front, the soft smaller, smaller than anal. Anal spine long, flexible. Clear olivaceous hyaline in life, with dark cross-bands, and a series of quadrate blotches on the side.

Total length 140 millim.

Indiana to Illinois, Alabama, and Arkansas.

### 10. ASPRO.

Dipterodon, part., *Lacép. Poiss.* iv. p. 165 (1802).
Zingel, *Cloquet, Dict. Sc. Nat.* ix. p. 240 (1817).
Cingla, *Fleming, Phil. Zool.* ii. p. 394 (1822). (No description.)
Aspro, *Cuv. & Val.* ii. p. 188 (1828); *Günth. Cat.* i. p. 78 (1859).
Asperulus, *Gill, Proc. Ac. Philad.* 1861, p. 46.

Body cylindrical or somewhat depressed; scales small, rough, denticulated. Lateral line complete; tube straight, not extending to the extremity of the scale. Mouth narrow, inferior, the præmaxillaries movable only on the sides; maxillary covered by the præorbital; villiform teeth in jaws and on vomer and palatines; head partly scaled, with more or less distinct large and shallow muciferous cavities beneath; posterior border of præopercle serrated, lower border smooth; opercle ending in a spine. Gill-membranes united in front; seven branchiostegals; pseudobranchiæ small; gill-rakers very short. Two well-separated dorsal fins, subequal in extent, with VIII–XV, I–II 10–20 rays. Anal shorter than either dorsal, with I–II 8–13 rays, spines very feeble. Caudal emarginate. Pectorals symmetrical, truncate or rounded, rays 14–16. Ventrals behind the base of the pectorals, separated by an interspace greater than the width of their base; spine feeble and closely attached to the soft rays. Vertebræ 44–47 (17–22+23–27).

Central Europe.

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*Synopsis of the Species.*

D. XIII–XV, I 18–20; A. I–II 11–13; Sc. 95–108 $\frac{7-8}{22-25}$; l. l. 83–92; depth of caudal peduncle 2 to 2½ times in distance between dorsal and caudal fins..... 1. *zingel*, p. 105.

D. IX–X, I–II 10–12; A. I–II 8–9; Sc. 65–80 $\frac{7-8}{20-25}$; l. l. 59–70; depth of caudal peduncle 3 times in distance between dorsal and caudal fins..... 2. *asper*, p. 106.

D. VIII–IX, I 12–13; A. I 10–12; Sc. 77–85 $\frac{4-5}{12-15}$; l. l. 70–81 depth of caudal peduncle 5 to 7 times in distance between dorsal and caudal fins..... 3. *streber*, p. 107.

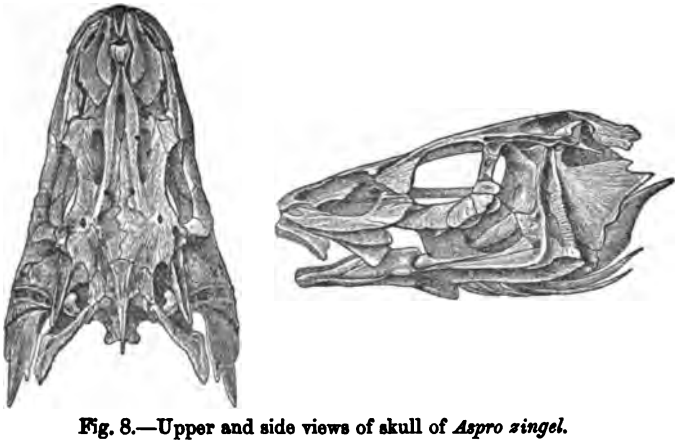

Fig. 8.—Upper and side views of skull of *Aspro zingel*.

## 1. Aspro zingel.

Perca zingel, *Linn. S. N.* i. p. 482 (1766); *Bloch, Fisch. Deutschl.* iii. p. 178, pl. cvi. (1784); *Meidinger, Icon. Pisc. Austr.* pl. iv. (1786).
Dipterodon zingel, *Lacép. Poiss.* iv. p. 171 (1802).
Zingel sciænoides, *Cloquet, Dict. Sc. Nat.* ix. p. 240 (1817).
Aspro zingel, *Cuv. & Val.* ii. p. 194 (1828); *Heck. & Kner, Süsswasserf. Oesterr.* p. 16, fig. (1858); *Günth.* i. p. 78 (1859); *Jeitteles, Verh. zool.-bot. Ges. Wien*, xii. 1862, p. 291; *Siebold, Süsswasserf. Mitteleur.* p. 53 (1863); *Seeley, Freshw. Fish. Eur.* p. 44 (1886).
Perca asper (*non Linn.*), *Gronow, Cat.* p. 115 (1854).

D. XIII–XV, I 18–20. A. I–II 11–13.
Sc. 95–108 $\frac{7-8}{22-25}$; l. l. 83–92.

Depth of body 6 to 7 times in total length, length of head 3⅓ to 3⅔ times; depth of caudal peduncle ½ to ½ distance between dorsal and caudal fins. Diameter of eye about ½ length of snout, ⅓ length of head, and less than interorbital width; maxillary extending

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to below posterior nostril; cheeks and upper surface of head, to between nostrils, scaled; usually one or two smaller spines below the strong opercular spine; clavicle with 2 to 4 spines; the distance between the mouth and the gill-cleft (measured on the median line) about $\frac{2}{5}$ length of head. The two dorsal fins equal in length and in depth; first spine short, second $\frac{2}{3}$ to $\frac{3}{4}$ length of third. Pectoral $\frac{1}{2}$, or rather more than $\frac{1}{2}$, length of head. Anal equal to the dorsals in depth. Middle caudal rays $\frac{2}{3}$ to $\frac{3}{4}$ length of outer. Breast naked; belly entirely scaled. Yellowish grey above, white beneath, with dark blotches and four irregular blackish or brown cross-bars obliquely directed forwards, the first in front of the dorsal.

Total length 270 millim.

Danube.

| | | |
|---|---|---|
| *a–b.* Ad. | Danube. | Stuttgart Museum [E.]. |
| *c–d.* Ad. | Danube. | Dr. Gemminger [C.]. |
| *e.* Ad., skin. | Danube. | Gronow Collection. |
| *f.* Ad. | ——? | Zoological Society. |
| *g.* Ad., skel. | Danube. | Stuttgart Museum [E.]. |

## 2. Aspro asper.

Perca asper, part., *Linn. S. N.* i. p. 482 (1766).
Dipterodon asper, part., *Lacép. Poiss.* iv. p. 170 (1802).
Zingel asper, part., *Cloquet, Dict. Sc. Nat.* ix. p. 240 (1817).
Aspro vulgaris, part., *Cuv. & Val.* ii. p. 188, pl. xxvi. (1828); *Günth.* i. p. 78 (1859).
Aspro apron, *Siebold, Süsswasserf. Mitteleur.* p. 55 (1863); *Fatio, Vert. Suisse*, iv. p. 56 (1882).
Aspro vulgaris, *Blanch. Poiss. Fr.* p. 143, fig. (1866); *Moreau, Poiss. Fr.* ii. p. 339, fig. (1881); *Seeley, Freshw. Fish. Eur.* p. 46* (1886).

D. IX–X, I–II 10–12. A. I–II 8–9. Sc. 65–80 $\frac{7-8}{20-25}$; l. l. 59–70.

Depth of body 5 to 6½ times in total length, length of head 3½ to 4 times; depth of caudal peduncle ½ distance between dorsal and caudal fins. Diameter of eye about ½ length of snout, ¼ length of head, and equal to or a little less than interorbital width; maxillary extending to below posterior nostril; cheeks and upper surface of head with patches of scales; opercular spine strong; clavicle with a strong spine; the distance between the mouth and the gill-cleft (measured on the median line) ⅓ length of head. Spinous dorsal longer and usually a little deeper than the soft; first spine very short. Pectoral ⅔ to ⅘ length of head. Anal deeper than soft dorsal. Middle caudal rays ¾ length of outer. Breast naked; belly entirely scaled. Yellowish brown or bronzy above, with three or four darker cross-bands, the first in front of the spinous dorsal, the second between the two dorsals, the third behind the soft dorsal; belly white.

* Heckel and Kner's figure, reproduced by Seeley under the name of *A. vulgaris*, represents, of course, the Danube species, *A. streber*.

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Total length 170 millim.
France (Rhone and its tributaries).

| | | |
|---|---|---|
| *a–b, c–i.* Ad. & hgr. | Rhone, Lyons. | Dr. L. Lortet [P.]. |
| *k.* Ad., skel. | Rhone, Lyons. | Dr. L. Lortet [P.]. |

### 3. Aspro streber.

Perca asper, part., *Linn. S. N.* i. p. 482 (1766).
Perca asper, *Bloch, Fisch. Deutschl.* iii. p. 175, pl. cvii. figs. 1 & 2 (1784).
Dipterodon asper, part., *Lacép. Poiss.* iv. p. 170 (1802).
Zingel asper, part., *Cloquet, Dict. Sc. Nat.* ix. p. 240 (1817).
Aspro vulgaris, part., *Cuv. & Val.* ii. p. 188 (1828); *Günth.* i. p. 78 (1859).
Aspro vulgaris, *Heck. & Kner, Süsswasserf. Oesterr.* p. 14, fig. (1858).
Aspro streber, *Siebold, Süsswasserf. Mitteleur.* p. 54 (1863); *Fatio, Vert. Suisse*, iv. p. 55 (1882); *Seeley, Freshw. Fish. Eur.* p. 48 (1886).

D. VIII–IX, I 12–13. A. I 10–12. Sc. 77–85 $\frac{4-5}{12-15}$; l. l. 70–81.

Depth of body 6 to 9 times in total length, length of head 4 to 4½ times; caudal peduncle very slender, its depth ⅛ to ⅐ distance between dorsal and caudal fins. Diameter of eye about ½ length of snout, ⅓ length of head, and equal to or a little less than interorbital width; maxillary extending to below posterior nostril; cheeks and upper surface of head, to between nostrils, scaled; opercular spine strong; clavicle with a strong spine; the distance between the mouth and the gill-cleft (measured on the median line) ⅓ to ⅔ length of head. The two dorsal fins equally long and equally deep; first spine ½ to ⅔ length of second. Pectoral ⅔ to ⅘ length of head. Anal deeper than dorsals. Middle caudal rays ⅘ to ⅚ length of outer. Breast and anterior part of belly naked. Yellowish brown above, with five dark brown or blackish cross-bands, the first in front of the spinous dorsal, the second across the posterior half of the spinous dorsal, the third across the soft dorsal, the fourth and fifth on the caudal peduncle; snout dark brown; belly white.
Total length 160 millim.
Danube.

| | | |
|---|---|---|
| *a–c.* Ad. | Danube. | Stuttgart Museum [E.]. |
| *d–e.* Ad. | R. Amper, Bavaria. | Dr. Gemminger [C.]. |
| *f.* Ad. | Danube. | Prof. L. Agassiz [P.]. |
| *g.* Ad. | Danube. | |

## 11. PERCARINA.

Percarina, *Nordmann, in Demid. Voy. Russ. Mér.* iii. p. 357 (1840); *Günth. Cat.* i. p. 73 (1859); *Bleek. Arch. Néerl.* xi. 1876, p. 266; *Kusnezoff, Trud. Soc. Nat. St. Petersb.* xix. 1888, p. 193.

Body compressed; scales small, thin, denticulated, more or less deciduous. Lateral line complete; the tube straight and occupying the whole length of the exposed surface of the scale. Mouth rather large, protractile; maxillary exposed; villiform teeth on outer and inner surface of jaws, on vomer and on palatines; head naked or

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partly scaly, with large muciferous cavities; præopercle spiniferous, the spines on the lower border antrorse; opercle ending in a spine. Gill-membranes separate; seven or eight branchiostegals; pseudobranchiæ rudimentary; gill-rakers rather long and slender. Dorsals distinct, contiguous, with IX–XI, II 9–13 rays, subequal in length. Anal as much developed as soft dorsal, with II 7–11 rays. Caudal bifid. Pectorals symmetrical, rounded, rays 11–13. Ventrals behind the base of the pectorals, separated by an interspace nearly equal to the width of their base; spine strong. Vertebræ 33–35 (14–15+19–20).

Mouths of rivers discharging into the Northern part of the Black Sea and the Sea of Azov.

### 1. Percarina demidoffii.

Percarina demidoffii, *Nordm. in Demid. Voy. Russ. Mér.* iii. p. 357, *Pisc.* pl. i. fig. 1 (1840); *Heck. & Kner, Süsswasserf. Oesterr.* p. 24, fig. (1858); *Günth.* i. p. 74 (1859); *Kessler, Bull. Soc. Nat. Mosc.* 1859, p. 189; *Seeley, Freshw. Fish. Eur.* p. 31 (1886); *Kusnezoff, Trud. Soc. Nat. St. Petersb.* xix. 1888, p. 200.

D. X–XI, II 10–13. A. II 8–11. Sc. 75 $\frac{5}{15}$; l. l. 33–37.

Depth of body 4 to 4½ times in total length, length of head 3 to 3½ times. Diameter of eye equal to length of snout, about ¼ length of head, and nearly equal to interorbital width; maxillary extending to below centre of eye or a little beyond, the width of its distal extremity about ½ diameter of eye; head naked, striated above; præopercle with 3 to 8 spines on posterior border and 2 or 3 on lower; clavicle with a strong spine. Dorsal originating above axilla; first dorsal spine ½ to ⅔ the length of second or longest, which does not exceed the longest soft rays. Pectoral rather more than ⅔ length of head. First anal spine much shorter than second. Middle caudal rays about half the length of outer. Breast naked. Silvery, with a series of round blackish spots along the back and a crescentic blotch on the occiput.

Total length 90 millim.

Southern Russia, at the mouths of rivers discharging into the Black Sea.

| | | |
|---|---|---|
| *a*. Ad. | R. Dniester. | St. Petersburg Mus. |
| *b–d*. Ad. | Akerman, mouth of Dniester. | St. Petersburg Mus. |
| *e*. Skeleton. | Ackerman. | St. Petersburg Mus. |

### 2. Percarina mæotica.

Percarina mæotica, *Kusnezoff, Trud. Soc. Nat. St. Petersb.* xix. 1888, p. 202.

D. IX–X, II 9–12. A. II 7–9. Sc. 75–78 $\frac{7}{18-19}$; l. l. 33–37.

Depth of body 3½ times in total length, length of head 2¾ times. Diameter of eye equal to length of snout, about ¼ length of head, and slightly less than interorbital width; maxillary not extending quite to below centre of eye, the width of its distal extremity about ½ diameter of eye; some scales on præopercle and opercle;

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præopercle with 5 or 6 spines on posterior border and 3 on lower. First dorsal spine $\frac{2}{3}$ to $\frac{3}{4}$ the length of second. Breast with or without scales. Colourless, except some fine black dots on the back and dorsals, and a crescentic dark marking on the occiput.

Total length 75 millim.

Sea of Azov.

*a–b*. Ad. Taganrog. St. Petersburg Mus.

One of the characters on which this species was founded, viz. the scaly breast as compared to the absence of scales on that region in *P. demidoffii*, is evidently of no more importance than in *Acerina*, in which it is highly variable, as first shown by Günther (Arch. f. Nat. 1855, p. 199); one of the two specimens in the Museum has the breast without any trace of scales. The presence of scales on the head is probably also not constant. But the shorter body appears to me a sufficient character for distinguishing *P. mœotica* from *P. demidoffii*.

## 12. ACERINA.

Gymnocephalus, part., *Bloch, Ausl. Fisch.* vii. p. 42 (1793).
Acerina, *Cuvier, R. An.* ii. p. 283 (1817); *Cuv. & Val.* iii. p. 3 (1829); *Günth. Cat.* i. p. 72 (1859).
Cernua, *Fleming, Brit. An.* p. 212 (1828).
Percis, *Gill, Proc. Ac. Philad.* 1861, p. 46; *Bleek. Arch. Néerl.* xi. 1876, p. 266.
Leptoperca, *Gill, l. c.* p. 502.
Gymnocephalus, *Bleek. l. c.*; *Gill, Proc. U.S. Nat. Mus.* xvii. 1894, p. 125.

Body compressed; scales rather small, rough, denticulated. Lateral line complete, the tube straight and occupying the whole length of the exposed surface of the scale. Mouth small, protractile; maxillary covered by the præorbital; jaws with villiform teeth; vomerine and palatine teeth few or absent; head naked, with large muciferous cavities; præopercle spiniferous, the spines on the lower border antrorse; opercle ending in a spine. Six or seven branchiostegals; pseudobranchiæ small; gill-rakers short. Dorsal fins confluent, with XIII–XIX 11–15 rays, the spinous portion longer than the soft. Anal short, with II 5–7 rays. Caudal emarginate. Pectorals sub-symmetrical, rounded, with 13–14 rays. Ventrals below or a little behind base of pectoral, with a strong spine, the distance between them equalling, or nearly equalling, the width of their base. Vertebræ 33–38 (14–15 + 20–23).

Europe; Northern Asia.

*Synopsis of the Species.*

I. Snout not or but slightly longer than the eye; D. XIII–XVI 11–15; sc. 65-75 $\frac{7-9}{16-21}$; lat. l. 35–40 ..... 1. *cernua*, p. 110.

II. Snout at least once and a half the diameter of the eye; D. XVII–XIX 12–14; lat. l. 55–80.

Depth of body $\frac{1}{4}$ total length; sc. $55\frac{6}{17}$ ..... 2. *rossica*, p. 111.

Depth of body $\frac{1}{5}$ to $\frac{3}{17}$ total length; sc. 65–80 $\frac{7-9}{19-22}$. 3. *schrætser*, p. 112.

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### 1. Acerina cernua.

Perca cernua, *Linn. S. N.* i. p. 487 (1766); *Bloch, Fisch. Deutschl.* ii. p. 74, pl. liii. fig. 2 (1783); *Meidinger, Icon. Pisc. Austr.* pl. iii. (1786); *Pall. Zoogr. Ross.-As.* iii. p. 245 (1811); *Gronow, Cat.* p. 112 (1854).

Gymnocephalus cernua, *Bl. Schn. Syst.* i. p. 345 (1801).

Holocentrus post, *Lacép. Poiss.* iv. p. 357 (1802).

Cernua fluviatilis, *Flem. Brit. An.* p. 212 (1828).

Acerina vulgaris, *Cuv. & Val.* iii. p. 4, pl. xli. (1829), and vii. p. 448 (1831); *Eichw. Zool. Spec.* iii. p. 83 (1831); *Fries & Ekstr. Skand. Fisk.* p. 9, pl. i. fig. 2 (1836); *Yarr. Brit. Fish.* p. 18, fig. (1836); *Kröyer, Danm. Fisk.* i. p. 43 (1838); *Nordm. in Demid. Voy. Russ. Mér.* iii. p. 368 (1840); *Yarr. Brit. Fish.* 2nd ed., p. 17, fig. (1841); *Günth. Fisch. Neck.* p. 14 (1853); *Heck. & Kner, Süsswasserf. Oesterr.* p. 19, fig. (1858); *Jeitteles, Verh. zool.-bot. Ges. Wien*, xii. 1862, p. 291; *Couch, Brit. Fish.* i. p. 193, pl. xli. (1862).

Acerina cernua, *Schinz, Faun. Helv.* p. 151 (1837); *Günth. Arch. f. Nat.* 1855, p. 199, pl. x. figs. 1 & 2; *Günth.* i. p. 72 (1859); *Siebold, Süsswasserf. Mitteleur.* p. 58 (1863); *Kessler, Invest. N. H. St. Petersb. Gov.* i. p. 24 (1864); *Blanch. Poiss. Fr.* p. 151, fig. (1866); *Malm, Göteb. Faun.* p. 382 (1877); *Houghton, Brit. Freshw. Fish.* p. 5, pl. — (1879); *Day, Fish. Gr. Brit.* p. 11, pl. iii. (1880); *Benecke, Fisch. O. u. Westpreuss.* p. 65, fig. (1881); *Moreau, Poiss. Fr.* ii. p. 344 (1881); *Lilljeb. Sver. o. Norg. Fisk.* i. p. 66 (1881); *Fatio, Vert. Suisse*, iv. p. 40 (1882); *Seeley, Freshw. Fish. Eur.* p. 33 (1886); *Sundman & Reuter, Finl. Fisk.* pl. xxiv. (1887); *Smitt, Scand. Fish.* i. p. 41, pl. iii. fig. 3 (1893).

Perca acerina, *Schleg. Dier. Nederl., Vissch.* p. 35, pl. iii. fig. 4 (1862).

Acerina czekanowskii, *Dybowski, Verh. zool.-bot. Ges. Wien*, xxiv. 1874, p. 383.

D. XIII–XVI 11–15. A. II 5–6. Sc. 65–75 $\frac{7-9}{16-21}$; l. l. 35–40.

Depth of body 3 to 4 times in total length, length of head 3 to 3½ times; profile curved from dorsal to mouth, with a more or less distinct concavity on the top of the head. Diameter of eye equal to or a little shorter than length of snout, ⅓ to ¼ length of head, greater than interorbital width; maxillary extending to below posterior nostril; top of head with radiating striæ; præopercle with five to ten spines on posterior border and three on lower; opercle striated, with strong spine; clavicle striated, with one or several spines; the distance between the mouth and the gill-cleft (measured on the median line) ⅓ to ⅖ length of head. Dorsal originating above base of pectoral; the spinous portion 2⅓ to 2½ as long as and deeper than the soft; first spine usually about ⅓ length of longest (4th or 5th). Pectoral about ⅔ length of head. Anal spines strong and subequal. Middle caudal rays about ¾ length of outer. Greenish olive, marbled and spotted with brown or black; dorsal and caudal, and sometimes also pectoral and anal, spotted with brown.

Total length 220 millim.

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Northern and Central Europe; Siberia as far east as Lake Baikal.

| | | |
|---|---|---|
| *a–c.* Ad. | Matlock, Derbyshire. | Dr. Günther [P.]. |
| *d.* Ad. | R. Glen, Lincolnshire. | Dr. Günther [P.]. |
| *e–h.* Hgr. & yg. | Thames at Hampton, Middlesex. | Mr. E. Dodson [P.]. |
| *i–k.* Hgr. | R. Munio, Lapland. | |
| *l.* Ad. | R. Glomen, Norway. | P. S. Godmin, Esq. [P.]. |
| *m–s.* Ad., hgr., & yg. | R. Gotha, Sweden. | Lloyd Collection. |
| *t.* Ad. | Göteborg, Sweden. | Dr. A. W. Malm [P.]. |
| *u–w.* Ad. | R. Trave, Germany. | Dr. Günther [P.]. |
| *x.* Ad. | Switzerland. | Prof. L. Agassiz [P.]. |
| *y–α.* Ad. | Würtemberg. | Stuttgart Museum [E.]. |
| *β–ε.* Ad. | Ingolstadt, Bavaria. | Dr. Gemminger [P.]. |
| *ζ.* Ad. | Danube. | |
| *η.* Ad. | R. Volga, nr. Novgorod. | Moscow University [E.]. |
| *θ–ι.* Ad. | Europe. | Yarrell Collection. |
| *κ.* Ad. | R. Polui, nr. Obórsk, Lower Obi. | Dr. O. Finsch [C.]. |
| *λ.* Ad. | Lake Tomsk, W. Siberia. | Prof. Eichwald [P.]. |
| *μ.* Ad., skin. | ——? | Gronow Collection. |
| *ν, ξ, ο.* Ad., skels. | S. Germany. | Dr. Günther [C.]. |
| *π, ρ.* Ad., skulls. | S. Germany. | Dr. Günther [C.]. |

## 2. Acerina rossica.

Acerina, *Güldenstaedt, N. Act. Sc. Petropol.* xix. 1775, p. 457, pl. xi.
Perca acerina, *Gmel. S. N.* i. p. 1321 (1789); *Pall. Zoogr. Ross.-As.* iii. p. 244 (1811).
Gymnocephalus acerina, *Bl. Schn. Syst.* i. p. 347 (1801).
Acerina rossica, *Cuv. & Val.* iii. p. 17 (1829), and vii. p. 449 (1831); *Nordm. in Demid. Voy. Russ. Mér.* iii. p. 369, *Pisc.* pl. ii. fig. 2 (1840); *Kessler, Bull. Soc. Nat. Mosc.* 1856, p. 340; *Günth.* i. p. 73 (1859); *Kner, Verh. zool.-bot. Ges. Wien,* xiv. 1864, p. 75; *Günth. Zool. Rec.* 1864, p. 150; *Frauenf. Verh. zool.-bot. Ges. Wien,* xix. 1869, p. 933; *Seeley, Freshw. Fish. Eur.* p. 38 (1886).
Acerina schrætzer, var., *Steind. Verh. zool.-bot. Ges. Wien,* xiv. 1864, p. 231.
Gymnocephalus tanaicensis, *Gill, Proc. U.S. Nat. Mus.* xvii. 1894, p. 125.

D. XVII–XIX 12–14. A. II 6. Sc. 55 $\frac{6}{17}$; l. l. 55.

Depth of body $\frac{1}{4}$ total length, length of head $\frac{1}{3}$. Diameter of eye $\frac{2}{5}$ to $\frac{1}{2}$ length of snout, $\frac{1}{4}$ length of head, much greater than interorbital width; maxillary extending to below anterior nostril; top of head with radiating striæ; præopercle with six or seven spines on posterior border and three on lower; opercular spine feeble; clavicle with a strong spine; the distance between the mouth and the gill-cleft (measured on the median line) $\frac{2}{3}$ length of head. Dorsal originating above axilla; the spinous portion thrice

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as long as and deeper than the soft; first spine not quite half as long as longest (3rd–5th). Pectoral not quite $\frac{3}{5}$ length of head. Anal spines strong and subequal. Olive-brown above, with round blackish spots disposed quincuncially; spinous dorsal with black spots.

Total length 160 millim.

South Russia, Crimea, and Galicia (Dniester, Dnieper, and Don systems).

| | | |
|---|---|---|
| *a*. Ad. | R. Don. | St. Petersburg Mus. |

### 3. Acerina schrætser.

Perca schrætser, *Linn. S. N.* i. p. 487 (1766); *Meidinger, Icones Pisc. Austr.* pl. ii. (1786).

Gymnocephalus schrætser, *Bloch, Ausl. Fisch.* vii. p. 26, pl. cccxxxii. (1793).

Holocentrus schrætser, *Lacép. Poiss.* iv. p. 347 (1802).

Acerina schraitzer, *Cuv. & Val.* iii. p. 13 (1829); *Heck. & Kner, Süsswasserf. Oesterr.* p. 22, fig. (1858); *Günth.* i. p. 73 (1859); *Jeitteles, Verh. zool.-bot. Ges. Wien*, xii. 1862, p. 291; *Siebold, Süsswasserf. Mitteleur.* p. 60 (1863); *Seeley, Freshw. Fish. Eur.* p. 37 (1886).

Perca danubiensis, *Gronow, Cat.* p. 112 (1854).

D. XVII–XIX 12–14. A. II 6–7. Sc. 65–80 $\frac{7-9}{19-22}$; l. l. 55–62.

Depth of body 5 to $5\frac{1}{2}$ times in total length, length of head $3\frac{1}{4}$ to $3\frac{1}{2}$ times; profile descending in a nearly straight line from the dorsal to the snout. Diameter of eye $\frac{2}{3}$ to $\frac{1}{2}$ length of snout, $\frac{1}{4}$ to $\frac{2}{7}$ length of head, greater than interorbital width; maxillary extending to below anterior nostril; top of head with radiating striæ; præopercle with seven to ten spines on posterior border and three to five on lower; opercle striated, with strong spine; clavicle striated, with one or two strong spines; the distance between the mouth and the gill-cleft (measured on the median line) $\frac{1}{2}$ length of head. Dorsal originating above base of pectoral or axilla; the spinous portion $2\frac{1}{2}$ to $2\frac{2}{3}$ as long as and deeper than the soft; first spine $\frac{1}{3}$ to $\frac{2}{5}$ length of longest (3rd to 5th, or 4th and 5th). Pectoral $\frac{1}{2}$ length of head or a little more. Anal spines strong and subequal. Brownish olive above, yellow on the sides, with three or four black longitudinal lines, which may be partly broken up into spots; spinous dorsal with black spots.

Total length 200 millim.

Danube system.

| | | |
|---|---|---|
| *a–c*. Ad. | Ingolstadt, Bavaria. | Dr. Gemminger [C.]. |
| *d–e*. Ad. | Danube. | Prof. L. Agassiz [P.]. |
| *f–h*. Ad. | Danube. | Stuttgart Museum [E.]. |
| *i*. Ad., skin. | Danube. | Gronow Collection. |

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# Fam. 3. SERRANIDÆ.

Second suborbital with an internal lamina supporting the globe of the eye; entopterygoid present. Anterior vertebræ without transverse processes; all or most of the ribs inserted on the transverse processes where these are developed. Two nostrils on each side. Gill-membranes free from isthmus; six or seven branchiostegals; gills four, a slit behind the fourth; pseudobranchiæ usually present. Pharyngeal bones usually

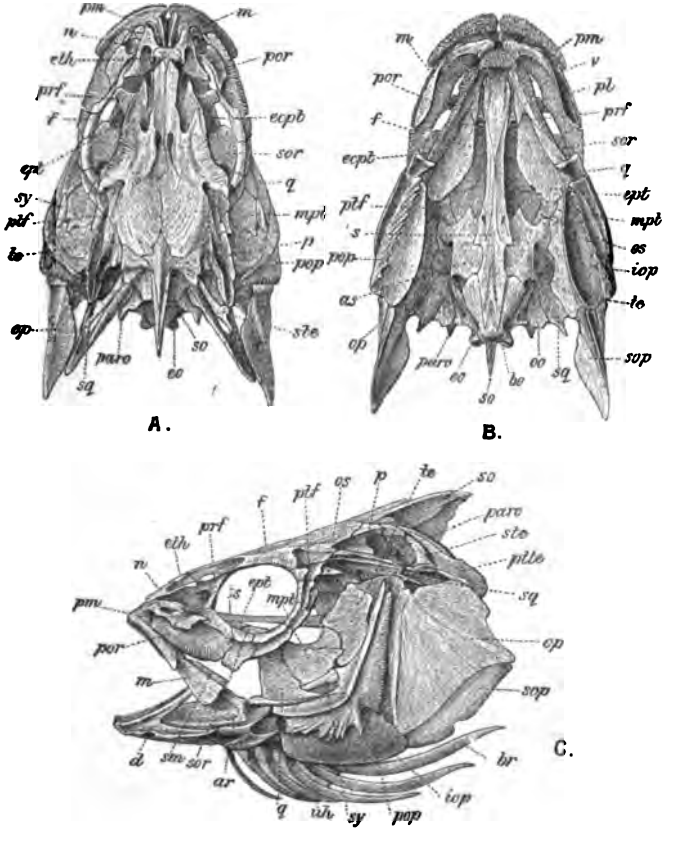


Fig. 9.—*Percichthys trucha.*
Upper (A), lower (B), and side (C) views of skull.
Lettering same as on fig. 1, p. 3.



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separate*. Soft portion of dorsal usually not much more developed than the anal.

This large family contains a great variety of types, and may be divided into a number of smaller groups, or subfamilies.

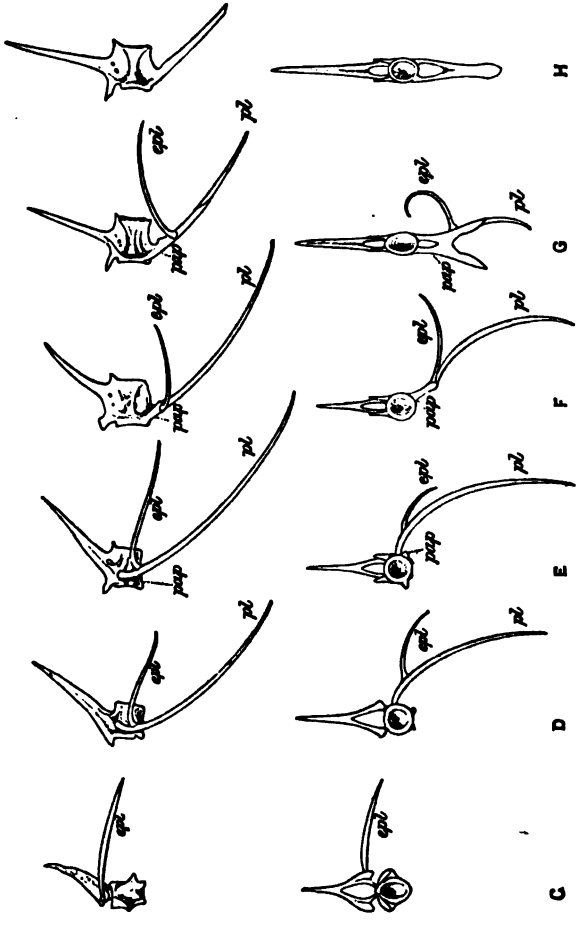


Fig. 10.—Vertebræ of *Serranus cabrilla*.
Side view and front view.
C. 1st vertebra; D. 3rd; E. 5th; F. 7th; G. 10th; H. 11th.
Lettering same as on fig. 2, p. 4.

## Subfam. 1. SERRANINÆ.

Maxillary exposed, its upper border not entirely slipping under the præorbital (except in *Macquaria*, the close affinity of which to *Ctenolates* is evident). Scales not deciduous; no scaly process at

* Lower pharyngeals united in *Centrogenys*, a fish otherwise closely allied to *Trachypoma*, in which they are distinct.

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base of ventral. Anal fin with three spines. Opercular membrane entirely free behind. Pseudobranchiæ present, well-developed.

The number of vertebræ ranges from 24 to 35. The structure of the vertebral column and its variations, as represented on the opposite page, are indicated in the following table, drawn up from the skeletons examined by me, and which should be compared with the tables on pages 5 and 43 :—

| | A. | B. | C. | D. | E. | F. | G. | H. |
|---|---|---|---|---|---|---|---|---|
| *Percichthys trucha* | 35 | 15 | 2 | 4 | 1 | 7 | 1 | 20 |
| —— *melanops* | 33 | 14 | 2 | 3 | 1 | 7 | 1 | 19 |
| *Percilia gilliesii* | 35 | 13 | 2 | 5 | 0 | 6 | 1 | 22 |
| *Lateolabrax japonicus* | 35 | 17 | 2 | 7 | 0 | 8 | 1 | 18 |
| *Niphon spinosus* | 31 | 14 | 2 | 5 | 1 | 5 | 3 | 17 |
| *Morone americana* | 25 | 12 | 2 | 1 | 2 | 7 | 2 | 13 |
| —— *multilineata* | 25 | 12 | 2 | 1 | 1 | 8 | 2 | 13 |
| —— *labrax* | 25 | 12 | 2 | 1 | 0 | 9 | 3 | 13 |
| *Percalates colonorum* | 25 | 11 | 2 | 4 | 1 | 4 | 0 | 14 |
| *Ctenolates ambiguus* | 26 | 11 | 2 | 4 | 1 | 4 | 1 | 15 |
| *Siniperca chuatsi* | 28 | 13 | 2 | 6 | 1 | 4 | 1 | 15 |
| *Acanthistius pictus* | 26 | 10 | 2 | 3 | 1 | 4 | 2 | 16 |
| —— *serratus* | 26 | 10 | 2 | 2 | 2 | 4 | 3 | 16 |
| *Pomodon macrophthalmus* | 25 | 10 | 2 | 4 | 0 | 4 | 3 | 15 |
| *Centrogenys vaigiensis* | 25 | 11 | 2 | 2 | 1 | 6 | 6 | 14 |
| *Polyprion americanus* | 27 | 13 | 2 | 4 | 1 | 6 | 3 | 14 |
| —— *prognathus* | 27 | 14 | 2 | 5 | 0 | 7 | 3 | 13 |
| *Oligorus macquariensis* | 35 | 16 | 2 | 3 | 0 | 11 | 1 | 19 |
| *Aulacocephalus temminckii* | 24 | 10 | 2 | 4 | 0 | 4 | 3 | 14 |
| *Plectropoma maculatum* | 24 | 10 | 2 | 3 | 0 | 5 | 3 | 14 |
| *Epinephelus louti* | 24 | 10 | 2 | 2 | 1 | 5 | 3 | 14 |
| —— *guttatus* | 24 | 10 | 2 | 4 | 0 | 4 | 3 | 14 |
| —— *punctatus* | 24 | 10 | 2 | 3 | 1 | 4 | 3 | 14 |
| —— *tæniops* | 24 | 10 | 2 | 3 | 1 | 4 | 3 | 14 |
| —— *areolatus* | 24 | 10 | 2 | 3 | 1 | 4 | 3 | 14 |
| —— *striatus* | 24 | 10 | 2 | 3 | 1 | 4 | 2 | 14 |
| —— *fasciatus* | 24 | 10 | 2 | 3 | 1 | 4 | 3 | 14 |
| —— *tauvina* | 24 | 10 | 2 | 3 | 1 | 4 | 3 | 14 |
| —— *itaiara* | 24 | 10 | 2 | 3 | 1 | 4 | 1 | 14 |
| —— *afer* | 24 | 10 | 2 | 3 | 0 | 5 | 3 | 14 |
| —— *bonaci* | 24 | 10 | 2 | 4 | 0 | 4 | 2 | 14 |
| *Anhyperodon leucogrammicus* | 24 | 10 | 2 | 4 | 0 | 4 | 3 | 14 |
| *Paranthias furcifer* | 24 | 10 | 2 | 3 | 1 | 4 | 3 | 14 |
| *Serranus humeralis* | 24 | 10 | 2 | 2 | 1 | 5 | 3 | 14 |
| —— *cabrilla* | 24 | 10 | 2 | 2 | 1 | 5 | 2 | 14 |
| —— *scriba* | 24 | 10 | 2 | 3 | 1 | 4 | 2 | 14 |
| *Gilbertia semicincta* | 27 | 10 | 2 | 3 | 1 | 4 | 4 | 17 |
| *Cæsioperca lepidoptera* | 26 | 10 | 2 | 2 | 0 | 6 | 2 | 16 |
| *Caprodon longimanus* | 26 | 10 | 2 | 1 | 0 | 7 | 1 | 16 |
| *Holanthias borbonius* | 26 | 10 | 2 | 1 | 2 | 5 | 3 | 16 |
| *Anthias sacer* | 26 | 10 | 2 | 2 | 1 | 5 | 1 | 16 |
| *Plectranthias anthioides* | 26 | 10 | 2 | 3 | 0 | 5 | 2 | 16 |
| *Callanthias peloritanus* | 24 | 11 | 2 | 0 | 0 | 9 | 1 | 13 |
| *Parapleiops meleagris* | 26 | 10 | 2 | 3 | 0 | 5 | 1 | 16 |
| *Plesiops nigricans* | 25 | 10 | 2 | 2 | 1 | 5 | 3 | 15 |



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Teeth are constantly present on the vomer, and, with a few exceptions, on the palatines; in a few genera the entopterygoids also are toothed. The pectoral fin may be symmetrical or asymmetrical, rounded or pointed, but never falciform; the first pterygial, or the first and a portion of the second, in contact with the coracoid. The air-bladder is present.

This subfamily is cosmopolitan. Some of the species inhabit fresh waters, but the great bulk are marine.

*Synopsis of the Genera.*

I. Two dorsals; pectoral asymmetrical, upper rays longest; ventrals below or a little behind base of pectoral.

A. Tongue smooth; scales ciliated; vertebræ 31–35.

Maxillary with supplemental bone; ventral below base of pectoral; palatines toothed; scales small ..... 1. PERCICHTHYS, p. 118.

Maxillary without supplemental bone; ventral a little behind base of pectoral; palatines toothless; scales large ..... 2. PERCILIA, p. 121.

Maxillary with supplemental bone; ventral a little behind base of pectoral; palatines toothed; scales small ..... 3. LATEOLABRAX, p. 122.

Maxillary without supplemental bone; ventral below base of pectoral; scales very small; a long and strong spine at angle of præopercle ..... 4. NIPHON, p. 124.

B. Tongue with patches of teeth; scales ciliated; vertebræ 25 or 26; maxillary without supplemental bone; ventral behind base of pectoral ..... 5. MORONE, p. 125.

C. Tongue smooth; scales cycloid; vertebræ 25; maxillary with supplemental bone ..... 6. PERCALATES, p. 132.

II. A single dorsal, which may be more or less deeply notched.

A. Lateral line single, extending along the middle of the side of the tail; ventral with five soft rays; opercle spiniferous.

1. Supplemental maxillary bone present; jaws without depressible, hinged teeth; spinous portion of dorsal longer than the soft; head without rugose dermo-ossification; vertebræ 25 or more.

*a.* Ventral below or a little behind base of pectoral; vertebræ 25–28.

*a.* Mouth moderate or rather small; no canine teeth; head with large muciferous cavities.

Maxillary exposed; scales small ..... 7. CTENOLATES, p. 133.

Maxillary entirely retractile under the præorbital; scales rather large ..... 8. MACQUARIA, p. 135.

*β.* Mouth large.

* Canine teeth more or less developed.

Scales cycloid; cheeks and opercles scaly, rest of head naked ..... 9. SINIPERCA, p. 136.

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Scales all or part ciliated; head nearly entirely scaly ..... 10. ACANTHISTIUS, p. 139.

** No canine teeth; tongue smooth.

† No fringed nasal tentacle.

Vertical fins scaly at the base ..... 11. POMODON, p. 144.
Vertical fins nearly entirely scaly..... 12. PARASCORPIS, p. 145.

†† Anterior nostril with a fringed tentacle.

Scales small, cycloid ..... 13. TRACHYPOMA, p. 145.
Scales large, ciliated; lower pharyngeal bones united..... 14. CENTROGENYS, p. 146.

*** No canine teeth; tongue with a patch of teeth; opercle with a strong horizontal ridge. 15. POLYPRION, p. 148.

*b.* Ventral a little in front of pectoral.

Pectoral rounded; vertebræ 35..... 16. OLIGORUS, p. 151.
Pectoral obtusely pointed; vertebræ 26 .... 17. STERROLEPIS, p. 152.

2. Supplemental maxillary bone present; no depressible, hinged teeth in jaws; spinous and soft portions of dorsal subequal; head without rugose dermo-ossification.

Pectoral obtusely pointed; some of the teeth enlarged ..... 18. DINOPERCA, p. 153.
Pectoral acutely pointed; teeth uniformly villiform ..... 19. LIOPROPOMA, p. 154.

3. Supplemental maxillary bone present; no depressible, hinged teeth; spinous portion of dorsal longer than the soft; head with rugose dermo-ossification; vertebræ 24. 20. AULACOCEPHALUS, [p. 157.

4. Supplemental maxillary bone present; inner teeth depressible, hinged; pectoral rounded; vertebræ 24.

*a.* Posterior nostril not slit-like; canine teeth usually more or less developed. [p. 158.

Dorsal spines 8; anal spines strong ..... 21. GONIOPLECTRUS,
Dorsal spines 6–8; anal spines feeble ..... 22. PLECTROPOMA, p. 159.
Dorsal spines 9–11 (or 12); anal spines strong; palatines toothed ..... 23. EPINEPHELUS, p. 162.
Dorsal spines 11; anal spines strong; palatines toothless ..... 24. ANHYPERODON, p. 269.

*b.* Posterior nostril a long vertical slit; canine teeth absent; dorsal spines 10 ..... 25. CROMILEPTES, p. 271.

*b.* Maxillary without or with a slight rudiment of supplemental bone.

*a.* Scales spinulose and ciliated; tubes of the lateral line straight or with an ascending tubule and extending along nearly the entire scale; vertebræ 24.

Ventral a little behind pectoral; a much developed scaly process above axilla .... 26. PARANTHIAS, p. 272.
Ventral below pectoral ..... 27. SERRANUS, p. 274.
Ventral entirely in front of pectoral; latter with the upper half vertically truncate; no hinged teeth ..... 28. CENTROPRISTES, [p. 302.

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Ventral entirely in front of pectoral; latter obtusely pointed; a few hinged teeth in upper jaw ..... 29. CHELIDOPERCA, [p. 304.

*b*. Scales spinulose and ciliated; tubes of lateral line very short, or bifurcate or branched; vertebræ 26 or 27.

*a*. Entopterygoids and tongue toothless.

Maxillary and mandible naked; canine teeth rather small ..... 30. GILBERTIA, p. 306.

Head entirely scaly; canine teeth extremely large ..... 31. COLPOGNATHUS, [p. 309.

Head entirely scaly; canines small ..... 32. CÆSIOPERCA, p. 311.

*β*. Entopterygoids toothed; a large patch of teeth on tongue. 33. CAPRODON, p. 314.

*c*. Scales smooth, ciliated; tubes of lateral line simple and extending along nearly the entire scale; vertebræ 25 or 26.

*a*. Entopterygoids toothed; a large patch of teeth on tongue. 34. HOLANTHIAS, p. 316.

*β*. No entopterygoid teeth; a large patch of teeth on tongue. 35. ODONTANTHIAS, p. 319.

*γ*. No entopterygoid teeth; tongue toothless or with a small group of teeth.

Pectoral rays branched; gill-rakers long and slender ..... 36. ANTHIAS, p. 320.

Pectoral rays branched; gill-rakers short .. 37. PLECTRANTHIAS, [p. 331.

Pectoral rays simple ..... 38. DACTYLANTHIAS, [p. 333.

B. Lateral line single, lost on the upper surface of the caudal peduncle or under the last dorsal rays; ventral with five soft rays; branchiostegals six.

Scales smooth, ciliate; opercle spiniferous; vertebræ 24 ..... 39. CALLANTHIAS, p. 333.

Scales cycloid; opercle without spines..... 40. PSEUDOPLESIOPS, [p. 336.

C. Lateral lines two, the upper lost on the upper surface of the caudal peduncle or under the last dorsal rays, the lower running along the middle of the side of the tail; ventral with four soft rays; branchiostegals six; vertebræ 25 or 26.

Maxillary with supplemental bone; a patch of teeth on the tongue ..... 41. PARAPLESIOPS, p. 336.

Maxillary with supplemental bone; tongue smooth ..... 42. PLESIOPS, p. 339.

No supplemental maxillary bone; tongue smooth ..... 43. TRACHINOPS, p. 342.

## 1. PERCICHTHYS.

Percichthys, *Girard, Proc. Ac. Philad.* 1854, p. 197, *and U.S. Nav. Astron. Exped.* ii. p. 230 (1855); *Günth. Cat.* i. p. 61 (1859); *Gill, Proc. Ac. Philad.* 1861, p. 51; *Bleek. Arch. Néerl.* xi. 1876, p. 265; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 336; *Bouleng. Mém. Soc. Sc. Chili*, iv. 1894, p. 10.

Percosoma, *Gill, l. c.*

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Body compressed; scales small, finely ciliated, concentrically striated. Lateral line complete; the tubes straight and occupying the whole length of the scale; mouth moderate, protractile; maxillary exposed, with supplemental bone; villiform teeth in jaws and on vomer and palatines; tongue smooth; head scaly, with rather large muciferous cavities; præopercle serrated, the spines on the lower border antrorse; opercle ending in a spine. Gill-membranes separate; six or seven branchiostegals; pseudobranchiæ present; gill-rakers short. Two dorsals, connected at the base, with VIII–XI, I–II 10–13 rays, the spinous longer than the soft; anal short, with III 8–10 rays; caudal truncate or slightly emarginate. Pectorals asymmetrical, obtusely pointed, rays 15–17, upper longest. Ventrals below base of pectorals, close together, with a strong spine. Posterior processes of præmaxillaries not extending to the frontals; parietal and supraoccipital bones short, not extending to between postfrontal processes; no parietal crest; supraoccipital crest strong, not extending to the anterior extremity of the bone. Vertebræ 33–35 (14–15+19–20).

Fresh waters of Chili, Western Argentina, and Patagonia.

*Synopsis of the Species.*

| | |
|---|---|
| Depth of body less than length of head; maxillary extending to below anterior third or centre of eye; 6 to 10 spines on lower border of præopercle | 1. *trucha*, p. 119. |
| Depth of body less than length of head; maxillary extending to below anterior border of eye; 6 spines on lower border of præopercle | 2. *vinciguerræ*, p. 120. |
| Depth of body equal to length of head; maxillary extending to below anterior border of eye; 10 to 13 spines on lower border of præopercle | 3. *melanops*, p. 120. |

## 1. Percichthys trucha.

Perca trucha, *Cuv. & Val.* ix. p. 429 (1833); *Guichen. in Gay, Hist. Chile, Zool.* ii. p. 146, pl. i. *b.* fig. 1 (1848).
Perca lævis, *Jenyns, Zool. Beagle, Fish*, p. 1, pl. i. (1842).
Percichthys trucha, *Girard, Proc. Ac. Philad.* 1854, p. 197, *and U.S. Nav. Astron. Exped.* ii. p. 230 (1855); *Günth.* i. p. 61 (1859); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 427; *Bouleng. Mém. Soc. Sc. Chili*, iv. 1894, p. 10.
Percichthys chilensis, *Girard, ll. cc.* pp. 197, 231, pl. xxix. figs. 1–4; *Philippi, Mon. Berl. Ac.* 1866, p. 708.
Percichthys lævis, *Günth. l. c.*; *Kner, Novara, Fische*, p. 11 (1865); *Jord. & Eigenm. l. c.*; *Perugia, Ann. Mus. Genova*, (2) x. 1891, p. 609.

D. IX–XI, I 10–13. A. III 8–10. Sc. 65–70 $\frac{8-10}{22-25}$; l. l. 62–70.

Greatest depth of body at origin of dorsal, 3½ to 4 times in total length, length of head 3 to 3⅓ times. Diameter of eye ½ to ⅔ length of snout, 5 to 7 times in length of head, equal to interorbital width in the young, about half in the adult; maxillary extending to below

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anterior third or centre of eye, the width of its distal extremity about $\frac{1}{2}$ or $\frac{3}{5}$ diameter of eye ($\frac{3}{4}$ in old specimens); præorbital finely serrated; head scaly to between the nostrils; 6 to 9 spines on lower border of præopercle; opercular spine strong. Gill-rakers short, 13 on lower part of anterior arch. Dorsal originating just behind vertical of axilla; spinous portion once and a half to twice length of soft; third dorsal spine longest, $\frac{1}{3}$ to $\frac{1}{2}$ length of head. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Second and third anal spines equal, or second slightly longer, about as long as second dorsal. Caudal truncate or slightly emarginate. Brown or olive above, golden below, with or without black dots or small spots; these may be present on the dorsal and anal fins also.

Total length 450 millim.

Chili, Western Argentina, Patagonia.

| | | |
|---|---|---|
| *a–b.* Hgr. | Santiago. | Prof. F. Lataste [P.]. |
| *c.* Hgr. | Santiago. | Mus. Compar. Zoology [E.]. |
| *d–h.* Yg. | Collipeumo, Itata. | Prof. F. Lataste [P.]. |
| *i–m.* Ad. | Chili. | Chilian Government [P.]. |
| *n–o.* Yg. | Tucuman. | |
| *p–q.* Yg. | North of Mendoza. | |
| *r.* Hgr. | Rio Santa Cruz, Patagonia. | Marquis G. Doria [P.]. |
| *s.* Hgr., skel. | Santiago. | Prof. F. Lataste [P.]. |

### 2. Percichthys vinciguerræ.

Percichthys vinciguerræ, *Perugia, Ann. Mus. Genov.* (2) x. 1891, p. 610.

D. X, I 11. A. III 9. Sc. $66\frac{7}{1}$.

Depth of body $3\frac{3}{4}$ times in total length, length of head $3\frac{1}{3}$ times. Diameter of eye $\frac{1}{2}$ length of snout and $\frac{2}{3}$ interorbital width; maxillary extending to below anterior border of eye; præorbital more strongly serrated than in *P. trucha*; 6 spines on lower border of præopercle; opercular spine strong. Third dorsal spine longest, $\frac{1}{2}$ length of head. Second anal spine strongest and longest. Caudal slightly emarginate. Yellowish, with minute dark dots; dorsal blackish or with blackish spots.

Total length 300 millim.

Rio Santa Cruz, Patagonia.

### 3. Percichthys melanops.

Percichthys melanops, *Girard, Proc. Ac. Philad.* 1854, p. 197, *and U.S. Nav. Astron. Exped.* ii. p. 233, pl. xxx. figs. 1–5 (1855); *Günth.* i. p. 61 (1859); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 428; *Bouleng. Mém. Soc. Sc. Chili*, iv. 1894, p. 13.

Percosoma melanops, *Gill, Proc. Ac. Philad.* 1861, p. 51.

Perca pocha, *Philippi, Arch. f. Nat.* 1863, p. 210.

Percichthys pocha, *Jord. & Eigenm. l. c.*

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D. VIII–X, I–II 10–12. A. III 9–10.
Sc. 60–65 $\frac{8-9}{28-26}$; l. l. 56–60.

Greatest depth of body at origin of dorsal, equal to length of head, $3\frac{1}{4}$ to $3\frac{1}{2}$ times in total length. Diameter of eye about $\frac{2}{3}$ length of snout, $4\frac{1}{2}$ to 5 times in length of head, nearly equal to interorbital width; maxillary reaching to below anterior border of eye; præorbital minutely serrated; præopercular spines more numerous than in *P. trucha*, 10 to 13 on the lower border; opercular spine strong. Gill-rakers short, 9 on lower part of anterior arch. Third or fourth dorsal spine longest, half length of head or more. Pectoral $\frac{1}{2}$ or $\frac{3}{5}$ length of head. Second anal spine longest, a little longer than second dorsal. Caudal truncate. Greyish brown or dark olive above, uniform or finely and closely speckled with black: whitish beneath.

Total length 180 millim.

Chili.

| | | |
|---|---|---|
| *a*-*b*. Ad. | Santiago. | Prof. F. Lataste [P.]. |
| *c*. Skeleton. | Santiago. | Prof. F. Lataste [P.]. |

## 2. PERCILIA.

Percilia, *Girard, Proc. Ac. Philad.* 1854, p. 197, *and U.S. Nav. Astron. Exped.* ii. p. 235 (1855); *Günth. Cat.* i. p. 255 (1859); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 336; *Bouleng. Mém. Soc. Sc. Chili*, iv. 1894, p. 15.

Body compressed; scales large, ciliate. Lateral line complete, the tube straight and occupying the whole length of the scale. Mouth moderate, protractile; maxillary exposed, without supplemental bone; teeth in jaws small, obtuse, in several rows; a few teeth on vomer, none on palatines; tongue smooth: head partly naked; præopercle with finely serrated posterior and entire lower border; opercular spine obtuse. Gill-membranes united across isthmus; five or six branchiostegals; pseudobranchiæ present; gill-rakers very short. Two dorsals, connected at the base, with VIII–IX, I 10–11 rays, the spinous longer than the soft; anal short, with III 8–10 rays. Caudal truncate. Pectorals asymmetrical, obtusely pointed, rays 15, upper longest. Ventrals a little behind base of pectorals, close together, with a strong spine. Posterior processes of præmaxillaries not extending to the frontals; parietal and supraoccipital bones short, not extending to between postfrontal processes; no parietal crest; supraoccipital crest strong, not extending to the anterior extremity of the bone. Vertebræ 35 (13+22).

Fresh waters of Chili.

### 1. Percilia gillissii.

Percilia gillissii, *Girard, Proc. Ac. Philad.* 1854, p. 197, *and U.S. Nav. Astron. Exped.* ii. p. 236, pl. xxix. figs. 5–9 (1855); *Günth.* i. p. 255 (1859); *Bouleng. Mém. Soc. Sc. Chili*, iv. 1894, p. 15.

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Perca segethi, *Philippi, Arch. f. Nat.* 1863, p. 211.
Percilia gracilis, *Philippi, Mon. Berl. Ac.* 1866, p. 710.

D. VIII–IX, I 10–11. A. III 8–10. Sc. 36–40 $\frac{4-5}{9-11}$; l. l. 33–35.

Depth of body 3¼ to 4 times in total length, length of head 3⅓ to 3½ times. Snout slightly overlapping lower jaw, as long as the diameter of the eye, which is 3½ to 4 times in length of head, and a little exceeds interorbital width; maxillary reaching to below anterior border of eye, the width of its distal extremity about ⅓ diameter of eye; head naked above, cheeks and opercles scaly. Gill-rakers very short, 10 to 12 on lower part of anterior arch. Dorsal originating behind vertical of axilla; spinous portion once and a half to once and two thirds as long as second; third or fourth dorsal spine longest, ⅗ to ⅔ length of head, and longer than longest soft rays. Pectoral ⅔ to ¾ length of head. Second anal spine longest. Caudal truncate. Brownish above, the scales often edged with black, yellowish beneath; young with eight or nine more or less distinct dark cross-bars and the caudal barred with blackish; lips, border of gill-membranes, pectoral, and border of dorsal fins red.

Total length 80 millim.
Chili.

| | | |
|---|---|---|
| *a–f.* Ad. & yg. | Collipeumo, Itata. | Prof. F. Lataste [P.]. |
| *g.* Skeleton. | Collipeumo, Itata. | Prof. F. Lataste [P.]. |

## 3. LATEOLABRAX.

Labrax, part., *Cuv. & Val.* ii. p. 55 (1828).
Lateolabrax, *Bleek. Ichth. Jap., Verh. Batav. Gen.* xxvi. 1857, p. 53, *and Arch. Néerl.* xi. 1876, p. 263.
Percalabrax, *Günth. Cat.* i. p. 70 (1859) *.

Body compressed; scales small, smooth, ciliated. Lateral line complete, the tube straight and occupying nearly the whole length of the scale. Mouth large, protractile; maxillary exposed, with supplemental bone; villiform teeth in jaws and on vomer and palatines; tongue smooth; head scaly; præopercle serrated, with a few strong antrorse spines on the lower border; opercle ending in a spine. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers long and slender. Two dorsals, connected at the base, with XI–XII, I–II 12–14 rays, the spinous portion longer than the soft; anal short, with III 8–9 rays. Caudal emarginate. Pectorals asymmetrical, obtusely pointed, rays 16–18, upper longest. Ventrals behind the base of the pectorals, close together, with a strong spine. Posterior processes of præmaxillaries not

* The name *Perca-labrax* was used by Temminck and Schlegel in the same sense as by Cuvier and Valenciennes (*cf.* their Atlas), i. e., *Labrax* being a subgenus of *Perca*; the name was never intended by them to denote a new genus.

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extending to the frontals; parietal and supraoccipital bones not extending to between postfrontal processes; supraoccipital and parietal crests strong, not produced on the frontal. Vertebræ 35 (17+18).

Coasts of China and Japan.

### 1. Lateolabrax japonicus.

Labrax japonicus, *Cuv. & Val.* ii. p. 85 (1828); *Bleek. Verh. Batav. Gen.* xxv. 1853, *Ichth. Jap.* p. 23.

Perca-labrax japonicus, *Temm. & Schleg. Faun. Japon., Pisc.* p. 2 pl. ii. fig. 1 (1844).

Lateolabrax japonicus, *Bleek. Verh. Batav. Gen.* xxvi. 1857, *Ichth. Jap.* p. 53.

Percalabrax japonicus, *Günth.* i. p. 71 (1859); *Kner, Novara, Fische,* p. 13 (1865); *Günth. Ann. & Mag. N. H.* (4) xii. 1873, p. 240; *Steind. & Döderl. Denkschr. Ak. Wien,* xlvii. 1883, p. 20, pl. iv. fig. 3; *Steind. Denkschr. Ak. Wien,* lix. 1892, p. 359.

Percalabrax pœcilonotus, *Guichen. in Dabry de Thiers, Pisc. en Chine,* pl. xxxvi. fig. 2 (1872).

Percalabrax spilonotus, *Guichen. l. c.* fig. 3.

D. XI–XII, I–II 12–14. A. III 8–9. Sc. 100–115 $\frac{13-17}{24-32}$; l. l. 80–95.

Greatest depth 4 to 4½ times in total length, length of head 3⅓ to 3½ times. Diameter of eye equal to length of snout or a little shorter, ⅓ to ¼ length of head, and equal to or a little less than interorbital width; lower jaw strongly projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity ⅔ to ¾ diameter of eye; præorbital entire; greater part of head covered with small scales; præopercle with strong spines at the angle and lower border, those on the latter two or three in number; opercular spine strong. Gill-rakers longer than gill-fringes, 16 to 18 on lower part of anterior arch. Dorsal originating above the axil; spines strong, fourth or fifth longest, longer than the longest soft rays, the others gradually increasing or decreasing in length; soft dorsal about ⅔ length of spinous. Pectoral about ⅔ length of head. First anal spine short, second very strong and long, as long as longest dorsal spine, third weaker and slightly shorter. Caudal feebly emarginate. Silvery, back grey; more or less numerous black spots on the back and dorsal fin.

Total length 450 millim. Grows to 800 millim.

Coasts and mouths of rivers of China and Japan.

| | | |
|---|---|---|
| *a.* Ad. | Japan. | |
| *b.* Ad., stffd. | Japan. | |
| *c.* Hgr. | China. | J. R. Reeves, Esq. [P.]. |
| *d.* Yg., stffd. | China. | J. R. Reeves, Esq. [P.]. |
| *e.* Ad. | China. | Chinese Commissioners, Int. Fisheries Exhib. [P.]. |
| *f–g.* Hgr. & yg. | China. | Haslar Collection. |
| *h.* Yg. | China. | R. Swinhoe, Esq. [C.]. |
| *i.* Ad. | Chefoo. | R. Swinhoe, Esq. [C.]. |

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| | | |
|---|---|---|
| *k.* Hgr. | Shanghai. | R. Swinhoe, Esq. [C.]. |
| *l.* Hgr. | Hae-yoe, Che Kiang. | P. W. Bassett Smith, Esq. [P.]. |
| *m.* Hgr. | Amoy. | |
| *n–p.* Hgr. & yg. | Chusan. | E. India Comp. |
| *q.* Ad. | Formosa. | R. Swinhoe, Esq. [P.]. |
| *r.* Hgr., skel. | China. | E. India Comp. |

## 4. NIPHON.

Niphon, *Cuv. & Val.* ii. p. 131 (1828); *Günth. Cat.* i. p. 80 (1859); *Gill, Proc. Ac. Philad.* 1861, p. 48; *Bleek. Arch. Néerl.* xi. 1876, p. 264.

Body compressed; scales very small, ciliated. Lateral line complete; the tube straight and occupying the whole length of the scale. Mouth large, protractile; maxillary exposed, without supplemental bone; villiform teeth in jaws and on vomer and palatines; tongue smooth; head scaly; præopercle serrated, with a very strong spine at the angle, and a few small antrorse spines on the lower border; opercle with three strong spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers long and slender. Two dorsals, connected at the base, with XI–XII, I 10–11 rays, the spinous portion longer than the soft. Anal short, with III 7 rays. Caudal slightly emarginate. Pectorals subsymmetrical, rounded, rays 16–17, upper longest. Ventrals below the base of the pectorals, close together, with a strong spine. Posterior processes of præmaxillaries not extending to the frontals; parietal and supraoccipital bones not extending to between postfrontal processes; no parietal crests; supraoccipital crest feeble, not extending to the anterior extremity of the bone. Vertebræ 31 (14+17).

Coasts of Japan.

### 1. Niphon spinosus.

Niphon spinosus, *Cuv. & Val.* ii. p. 131, pl. xix. (1828); *Temm. & Schleg. Faun. Japon., Pisc.* p. 1, pl. i. (1844); *Günth.* i. p. 80 (1859); *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 228.

D. XI–XII, I 10–11. A. III 7. Sc. 150–170 $\frac{20-23}{56-60}$; l. l. 84–90.

Depth of body $3\frac{2}{3}$ to 4 times in total length, length of head $2\frac{1}{2}$ to 3 times. Diameter of eye considerably shorter than snout, $\frac{1}{4}$ (young) to $\frac{1}{5}$ (adult) length of head, and nearly equal to interorbital width; lower jaw strongly projecting; maxillary extending to below anterior third or centre of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye; præorbital serrated; upper surface of head striated, with few scales; cheeks and opercles closely scaled; spine at angle of præopercle $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye, shorter than posterior border of præopercle; four spines on the lower border of the præopercle; middle opercular spine strongest, a little shorter than the præopercular; a clavicular and a supraclavicular spine. Gill-rakers longer than gill-fringes, 16 on lower

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part of anterior arch. Dorsal originating above axilla; spines strong, fourth longest, slightly longer than longest soft rays, the others gradually increasing or decreasing in length; soft dorsal about half length of spinous. Pectoral $\frac{2}{6}$ to $\frac{1}{2}$ length of head. Anal spines strong, first shortest, second strongest, about as long as the eighth dorsal spine, third as long or slightly shorter. Caudal slightly emarginate. Brownish above, silvery below; young with a dark-brown stripe on each side of head and body, passing through the eye, and a black blotch on the soft dorsal and on the upper and lower caudal lobes.

Total length 330 millim.

Coasts of Japan.

| | | |
|---|---|---|
| *a*, *b*. Ad. & yg., stffd. | Japan. | |
| *c*. Hgr. | Yokohama. | H.M.S. 'Challenger.' |
| *d*. Hgr., skel. | Yokohama. | H.M.S. 'Challenger.' |

## 5. MORONE.

Centropomus, part., *Lacép. Poiss.* iv. p. 248 (1802).
Morone, part., *Mitchill, Rep. Fish. N. York*, p. 18 (1814).
Roccus, *Mitchill, l. c.* p. 25; *Gill, Proc. Ac. Philad.* 1860, p. 111, & 1861, p. 49; *Jord. & Gilb. Syn. Fish. N. Am.* p. 528 (1882).
Lepibema, *Rafin. Ichth. Ohi.* p. 23 (1820); *Gill, Proc. Ac. Philad.* 1861, p. 49; *Steind. Verh. zool.-bot. Ges. Wien*, xii. 1862, p. 499.
Labrax (*non Pall.*), *Cuv. & Val.* ii. p. 55 (1828); *Günth. Cat.* i. p. 63 (1859); *Gill, Proc. Ac. Philad.* 1860, p. 110; *Bleek. Arch. Néerl.* xi. 1876.
Dicentrarchus, *Gill, l. c.* p. 111; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 424.
Morone, *Gill, Proc. Ac. Philad.* 1860, p. 115, & 1861, p. 50; *Bleek. l. c.* p. 263; *Jord. & Eigenm. l. c.* p. 420.

Fig. 11.—Upper view of cranium of *Morone labrax*.

Body compressed; scales moderate or rather large, smooth,

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ciliated. Lateral line complete, the tube straight and extending along the whole length of the scale. Mouth moderate or rather large, protractile; maxillary exposed, without supplemental bone; villiform teeth in jaws and on vomer and palatines; tongue with patches of teeth; head scaly; præopercle serrated; opercle with two feeble spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers long. Two dorsals, contiguous or narrowly separated, with VIII–X, I 11–14 rays, the spinous a little longer than the soft. Anal short, with III 8–12 rays. Caudal emarginate. Pectorals asymmetrical, obtusely pointed, with 15–17 rays, upper longest. Ventrals behind base of pectorals, close together, with a strong spine. Posterior processes of præmaxillaries not extending to the frontals; parietal and supraoccipital bones short; parietal crests feeble; supraoccipital crest strong, not produced forward on the frontals. Vertebræ 25 (12+13).

Atlantic, and mouths of rivers, north of the tropic; fresh waters of North America (Mississippi and eastwards); Mediterranean.

*Synopsis of the Species.*

I. The two dorsal fins in contact, more or less connected; edge of tongue with linear patches of teeth, none at the base; no antrorse spines on lower border of præopercle.

Longest dorsal spine about half length of head. 1. *americana*, p. 126.
Longest dorsal spine considerably more than half length of head ..... 2. *mississippiensis*, p. 127.

II. Dorsal fins entirely separated; base of tongue with one or two patches of teeth.

A. No antrorse spines on lower border of præopercle.

Third anal spine $\frac{2}{3}$ to $\frac{1}{2}$ length of head..... 3. *multilineata*, p. 128.
Third anal spine $\frac{1}{4}$ to $\frac{1}{3}$ length of head..... 4. *lineata*, p. 129.

B. Lower border of præopercle with a few strong antrorse spines.

Group of vomerine teeth without posterior process ..... 5. *labrax*, p. 130.
Group of vomerine teeth with a more or less elongate backward process..... 6. *punctata*, p. 131.

## 1. Morone americana.

*Schœpf, Schr. Ges. naturf. Fr. Berl.* viii. 1788, p. 159.
Perca americana, *Gmel. S. N.* i. p. 1308 (1789).
Perca immaculata, *Walb. Art. Gen. Pisc.* iii. p. 330 (1792).
Morone pallida, *Mitchill, Rep. Fish. N. Y.* p. 18 (1814).
Morone rufa, *Mitchill, l. c.*
Bodianus pallidus, *Mitchill, Trans. Lit. & Phil. Soc. N. Y.* i. 1815, p. 420.
Bodianus rufus, *Mitchill, l. c.*
Perca mucronata, *Rafin. Am. Monthly Mag.* ii. 1818, p. 205.
Labrax mucronatus, *Cuv. & Val.* ii. p. 86, pl. xii. (1828); *Storer, Rep. Fish. Mass.* p. 8 (1839).
Labrax rufus, *Dekay, N. Y. Faun., Fish.* p. 9, pl. iii. fig. 7 (1842); *Storer, Mem. Amer. Acad.* (2) v. 1853, p. 57, pl. i. fig. 1.
Labrax pallidus, *Dekay, l. c.* p. 11, pl. i. fig. 2; *Günth.* i. p. 67 (1859).

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Labrax nigricans, *Dekay, l. c.* p. 12, pl. l. fig. 160.
Labrax americanus, *Holbr. Ichth. N. Carol.* p. 20, pl. iii. fig. 2 (1856).
Labrax rufus, part., *Günth. t. c.* p. 65.
Morone americana, *Gill, Proc. Ac. Philad.* 1860, p. 116; *Goode, N. Am. Fish.* p. 35, fig. (1888); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 421.
Lepibema americanum, *Steind. Verh. zool.-bot. Ges. Wien*, xii. 1862, p. 504.
Roccus americanus, *Jord. & Gilb. Syn. Fish. N. Am.* p. 530 (1882); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. clxxiii. (1884).

D. IX, I 12. A. III 8–9. Sc. 50–55 $\frac{7-8}{12-13}$; l. l. 50–55.

Greatest depth at origin of dorsal fin, 2½ to 3 times in total length, length of head 2¾ to 3 times. Diameter of eye about equal to length of snout, and ¼ length of head; interorbital space wide; lower jaw not projecting; maxillary extending to below anterior third or centre of eye, the width of its distal extremity about ½ diameter of eye; præorbital very finely denticulated; head scaled to between the nostrils; præopercular serræ feeble, strongest at the angle. Base of tongue without teeth; edge of tongue with linear patches of teeth. Gill-rakers about as long as gill-fringes, 15 to 17 on lower part of anterior arch. Dorsal originating above the axil, the spinous and soft portions connected at the base; spines strong, fourth longest, about half length of head. Pectoral ⅔ to ¾ length of head. First anal spine short, second and third nearly equal, about ½ length of head. Middle caudal rays about ⅔ length of outer. Olivaceous to dark green above; sides silvery or olivaceous, with or without faint paler streaks.

Total length 265 millim.

Atlantic coast of North America, from Nova Scotia to South Carolina, ascending streams.

| | | |
|---|---|---|
| *a*. Ad. | Boston. | W. Winstone, Esq. [P.]. |
| *b, c*. Ad. | Potomac R. | Smithsonian Instit. |
| *d*. Hgr., skin. | New York. | Parnell Collection. |
| *e*. Hgr. | N. America. | Museum Godeffroy. |
| *f*. Ad., skel. | New York. | |

## 2. Morone mississippiensis.

Labrax rufus, part., *Günth.* i. p. 65 (1859).
Labrax chrysops (*non Raf.*), *Girard, Rep. Explor. R. R.* x. pt. iv. p. 29, pl. xi. figs. 1–4 (1859).
Morone interrupta (*non Mitch.*), *Gill, Proc. Ac. Philad.* 1860, p. 118; *Goode, N. Am. Fish.* p. 33, fig. (1888); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 420, pl. lxvi.
Lepibema interruptum, *Steind. Verh. zool.-bot. Ges. Wien*, xii. 1862, p. 504, pl. xiv.
Roccus interruptus, *Jord. Geol. Surv. Ohio*, iv. p. 956 (1882); *Jord. & Gilb. Syn. Fish. N. Am.* p. 530 (1882); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. clxxii. (1884).
Morone mississippiensis, *Jord. & Eigenm. Proc. Ac. Philad.* 1887, p. 295.

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D. IX–X, I 11–12. A. III 10. Sc. 50–54 $\frac{7}{11-12}$.

Very closely allied to the preceding, but back more arched, fourth dorsal spine about $\frac{3}{5}$ length of head, and longest anal spine half length of head. Gill-rakers longer than gill-fringes, 16 on lower part of anterior arch. Brassy yellow, with about seven very distinct black longitudinal streaks, which below the lateral line are broken up posteriorly, those on the tail alternating with those on the body.

Total length 170 millim.

Lower Mississippi Valley.

*a*. Ad. New Orleans.

### 3. Morone multilineata.

? Perca chrysops, *Rafin. Ichth. Oh.* p. 22 (1820).

Labrax multilineatus, *Cuv. & Val.* iii. p. 488 (1829); *Kirtland, Bost. Journ. N. H.* v. 1845, p. 21, pl. vii. fig. 1; *Günth.* i. p. 67 (1859).

Labrax notatus (*C. H. Smith*), *Richards. Faun. Bor.-Am., Fish.* p. 8 (1836); *Günth. l. c.*

Labrax albidus, *Dekay, N. Y. Faun., Fish.* p. 13, pl. li. fig. 165 (1842).

Labrax osculatii, *Filippi, Rev. et Mag. de Zool.* (2) v. 1853, p. 164; *Günth. t. c.* p. 65.

Labrax rufus, part., *Günth. l. c.*

Labrax chrysops, *Gill, Proc. Ac. Philad.* 1860, p. 20.

Roccus chrysops, *Gill, t. c.* p. 113; *Jord. Geol. Surv. Ohio*, iv. p. 955 (1882); *Jord. & Gilb. Syn. Fish. N. A.* p. 529 (1882); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. clxxi. (1884), *and Fish. N. Am.* p. 32, fig. (1888); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 422, pl. lxviii.

Lepibema chrysops, *Steind. Verh. zool.-bot. Ges. Wien*, xii. 1862, p. 504.

D. IX, I 13–14. A. III 11–12. Sc. 55–65 $\frac{9-10}{15-16}$; l. l. 53–61.

Depth of body $2\frac{1}{2}$ to $2\frac{3}{4}$ times in total length, length of head $3\frac{1}{4}$ to $3\frac{2}{3}$ times. Diameter of eye about equal to length of snout, $\frac{1}{4}$ to $\frac{1}{5}$ length of head; interorbital space wide; lower jaw slightly projecting; maxillary extending to below centre of eye, the width of its distal extremity $\frac{3}{5}$ to $\frac{2}{3}$ diameter of eye; præorbital entire; head scaled to between the nostrils; præopercular serræ feeble, strongest at the angle. A patch of teeth on each side of the tongue, and a third at its base. Gill-rakers at least as long as gill-fringes, 14 to 16 on lower part of anterior arch. Dorsal originating behind vertical of axil; the two portions completely separated; spines strong, fourth longest, about half length of head. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Anal spines increasing in size, third measuring about $\frac{1}{3}$ length of head. Middle caudal rays about $\frac{2}{5}$ length of outer. Silvery or golden, above with more or less distinct, continuous or interrupted narrow dusky longitudinal lines.

Total length 360 millim.

Ohio and Upper Mississippi valleys and Great Lakes district.

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| | | |
|---|---|---|
| *a–b*. Ad. & hgr. | Lake Erie. | |
| *c–d*. Ad. | Toledo, L. Erie. | |
| *e*. Yg. | Sandusky, Ohio. | Smithsonian Instit. |
| *f*. Ad., skin. | N. America. | Parnell Collection. |
| *g*. Ad., skel. | Toledo, L. Erie. | |

## 4. Morone lineata.

*Schœpf, Schr. Ges. naturf. Fr. Berl.* viii. 1788, p. 160.
Sciæna lineata, *Bloch, Ausl. Fische*, vi. p. 62, pl. cccix. (1792).
Perca saxatilis, *Walb. Art. Gen. Pisc.* iii. p. 330 (1792).
Perca septentrionalis, *Bl. Schn. Syst.* i. p. 90, pl. xx. (1801).
Centropomus lineatus, *Lacép. Hist. Poiss.* iv. p. 257 (1802).
Roccus striatus, *Mitchill, Rep. Fish. N. Y.* p. 25 (1814); *Bean, Proc. U.S. Nat. Mus.* vii. 1884, p. 242.
Perca mitchillii, *Mitchill, Tr. Lit. & Phil. Soc. N. Y.* i. 1815, p. 413, pl. iii. fig. 4.
Perca mitchillii interrupta, *Mitch. l. c.*
Perca mitchillii alternata, *Mitch. l. c.*
Lepibema mitchillii, *Rafin. Ichth. Oh.* p. 23 (1820).
Labrax lineatus, *Cuv. & Val.* ii. p. 79 (1828); *Storer, Rep. Fish. Mass.* p. 7 (1839); *Dekay, N. Y. Faun., Fish.* p. 7, pl. i. fig. 3 (1842); *Storer, Mem. Amer. Acad.* (2) v. 1853, p. 54, pl. i. fig. 4; *Günth.* i. p. 64 (1859); *Holbr. Ichth. S. Carol.* p. 24, pl. iv. fig. 1 (1860).
Roccus lineatus, *Gill, Proc. Ac. Philad.* 1860, p. 112; *Kilbourne & Goode, Game Fish. U.S.* pl. — (1879); *Jord. & Gilb. Syn. Fish. N. A.* p. 529 (1882); *Goode, Fish. & Fisher. Ind. U.S.* i. pl. clxx. (1884), *and N. Am. Fish.* p. 22, fig. (1888); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 423, pl. lxix.
Lepibema lineatum, *Steind. Verh. zool.-bot. Ges. Wien*, xii. 1862, p. 504.
Roccus saxatilis, *Jord. & Gilb. Proc. U.S. Nat. Mus.* v. 1882, p. 599.
Roccus septentrionalis, *Jord. Proc. U.S. Nat. Mus.* vii. 1885, p. 73.
Morone lineata, *Jord. & Eigenm. Proc. Ac. Philad.* 1887, p. 295.

D. IX, I 12. A. III 11. Sc. 63–70 $\frac{8-10}{15-16}$; l. l. 62–66.

Back not elevated; depth of body $3\frac{2}{3}$ to 4 times in total length, length of head $3\frac{1}{4}$ to $3\frac{1}{2}$ times. Diameter of eye $\frac{1}{2}$ to $\frac{2}{3}$ length of snout, $\frac{1}{6}$ to $\frac{1}{7}$ length of head; interorbital space wide; lower jaw projecting; maxillary extending to below anterior third or centre of eye, the width of its distal extremity $\frac{2}{5}$ to $\frac{2}{3}$ diameter of eye; præorbital entire; head scaled to between the nostrils; præopercular serræ feeble, strongest at the angle. Four elongate patches of teeth on the tongue, two at the base. Gill-rakers as long as gill-fringes, 16 on lower part of anterior arch. Dorsal originating behind vertical of axil; the two portions completely separated; spines strong, fourth longest, $\frac{2}{3}$ to $\frac{1}{2}$ length of head. Pectoral about half length of head. Anal spines increasing in size, third measuring $\frac{2}{5}$ to $\frac{1}{4}$ length of head. Middle caudal rays about $\frac{2}{5}$ length of outer. Olivaceous above, silvery or golden below, with seven or eight regular or irregular (var. *interrupta*) dark longitudinal streaks.

Total length 500 millim.



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Atlantic coast of North America, from New Brunswick to Florida; ascending rivers in spring.

| | | |
|---|---|---|
| *a*. Ad., skin. | New York. | Parnell Collection. |
| *b*. Ad., skin (var. *interrupta*). | New York. | Parnell Collection. |
| *c*. Ad., stffd. | Wilmington, Delaware. | E. Doubleday, Esq. [P.]. |
| *d*. Ad. | Potomac R. | Smithsonian Instit. |
| *e*. Ad. | N. America. | |

### 5. Morone labrax.

Perca labrax, *Linn. S. N.* i. p. 482 (1766); *Donov. Brit. Fish.* ii. pl. xliii. (1802); *Gronow, Cat.* p. 115 (1854).
Perca punctata, *Gmel. S. N.* i. p. 1311 (1789).
Sciæna labrax, *Bloch, Ausl. Fische*, vi. p. 52, pl. ccci. (1792).
Sciæna diacantha, *Bloch, t. c.* p. 58, pl. cccii.
Perca diacantha, *Bl. Schn. Syst.* i. p. 85 (1801).
Centropomus lupus, *Lacép. Poiss.* iv. p. 267 (1802).
Perca elongata, *Geoffr. Descr. Egypte, Poiss.* pl. xix. fig. 1 (1809).
Perca sinuosa, *Geoffr. l. c.* p. 316, pl. xx. fig. 3.
Labrax lupus, *Cuv. & Val.* ii. p. 56, pl. ii. (1828); *Yarr. Brit. Fish.* i. p. 6, fig. (1836); *Bonap. Icon. Faun. Ital., Pesci* (1836); *Kröyer, Danm. Fisk.* i. p. 23 (1838); *Costa, Faun. Nap., Pesci*, pl. v. (1850); *Günth.* i. p. 63 (1859); *Steind. Verh. zool.-bot. Ges. Wien*, xii. 1862, p. 496; *Couch, Brit. Fish.* i. p. 189, pl. xl. (1862); *Günth. Ann. & Mag. N. H.* (3) xii. 1863, p. 175; *Brito Capello, Jorn. Sc. Lisb.* i. 1867, p. 154, figs.; *Steind. Sitzb. Ak. Wien*, lvi. i. 1867, p. 606; *Canestr. Faun. Ital., Pesci*, p. 78 (1874); *Collett, Vid. Selsk. Forh. Christ. f.* 1874, no. 3, p. 15 (1875); *Day, Fish. Gr. Brit.* p. 8, pl. ii. (1880); *Moreau, Poiss. Fr.* ii. p. 333 (1881); *Lilljeb. Sver. o. Norg. Fisk.* i. p. 55 (1881); *Möbius & Heincke, Fisch. Ostsee*, p. 31 (1883); *Seeley, Freshw. Fish. Eur.* p. 29 (1886); *Doderl. Man. Ittiol. Mediterr.* iv. p. 16 (1889).
Labrax elongatus, *Cuv. & Val. t. c.* p. 77; *Günth. t. c.* p. 64.
Labrax vulgaris, *Guér. Icon. R. A., Poiss.* pl. i. fig. 4 (1829).
Labrax diacanthus, *Gill, Proc. Ac. Philad.* 1860, p. 110; *Peters, Mon. Berl. Ac.* 1865, p. 96.
Dicentrarchus elongatus, *Gill, l. c.* p. 111.
Labrax linnei, *Malm, Göteb. Bohusl. Faun.* p. 379 (1877).
Dicentrarchus labrax, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 425.
Roccus labrax, *Smitt, Scand. Fish.* i. p. 45, fig. (1893).

D. VIII–X, I 12. A. III 10–12. Sc. 65–80 $\frac{10-12}{16-21}$; l. l. 65–80.

Depth of body $3\frac{2}{3}$ to $4\frac{1}{2}$ times in total length, length of head 3 to $3\frac{1}{4}$ times. Snout once and a half to twice diameter of eye, which is $\frac{1}{5}$ to $\frac{1}{7}$ length of head in the adult; interorbital space wide, covered with cycloid scales; lower jaw slightly projecting; maxillary extending to below anterior third or centre of eye, the width of its distal extremity $\frac{3}{5}$ to $\frac{3}{4}$ diameter of eye; præorbital entire; four to six strong antrorse spines on lower border of præopercle; lower opercular spine stronger than upper. Vomerine teeth forming a crescentic group; a patch of teeth along the middle

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of the tongue and others on the borders. Gill-rakers longer than gill-fringes, 16 to 18 on lower part of anterior arch. Dorsal originating behind vertical of axil; spines rather strong, fourth and fifth longest, $\frac{2}{5}$ to $\frac{3}{5}$ length of head. Pectoral about half length of head. Third anal spine longest, $\frac{1}{4}$ to $\frac{1}{3}$ length of head. Middle caudal rays about $\frac{2}{3}$ length of outer. Silvery, back grey or olive, without spots in the adult, sometimes black-spotted in the young and half-grown; a blackish spot at the end of the opercle.

Total length 800 millim.

Coasts of Europe, as far north as Finmark; Mediterranean.

| | | |
|---|---|---|
| *a*. Hgr., skin. | Solway. | Dr. Günther [P.]. |
| *b*. Ad. | Lyme Regis. | |
| *c*. Yg., skin. | South Devon. | |
| *d*, *e*. Ad., stffd. | England. | |
| *f*. Hgr., skin. | England. | Yarrell Collection. |
| *g*–*h*. Yg. | England. | W. Yarrell, Esq. [P.]. |
| *i*. Hgr. | Lisbon. | Rev. R. T. Lowe [P.]. |
| *k*, *l*. Hgr., skins. | Lisbon. | |
| *m*–*q*. Yg. | Seville. | P. L. Sclater, Esq. [P.]. |
| *r*–*s*. Ad. | Propontis. | Dr. Millingen [P.]. |
| *t*–*v*. Ad. & hgr. | Constantinople. | Dr. Dickson [P.]. |
| *w*. Hgr. | —— ? | Museum Godeffroy. |
| *x*. Yg., skin. | —— ? | Gronow Collection. |
| *y*. Ad., skel. | England. | |

## 6. Morone punctata.

Scisæna punctata, *Bloch, Ausl. Fische*, vi. p. 64, pl. cccv. (1792).

Perca punctulata, *Lacép. Poiss.* iv. p. 418 (1802).

Perca punctata, *Geoffr. Descr. Egypte, Poiss.* p. 316, pl. xx. fig. 2 (1809).

Labrax punctatus, *Günth. Ann. & Mag. N. H.* (3) xii. 1863, p. 175; *Brito Capello, Jorn. Sc. Lisb.* i. 1867, p. 154, figs.; *Steind. Sitzb. Ak. Wien*, lvi. i. 1867, p. 607, and lx. i. 1869, p. 671; *Moreau, Poiss. Fr.* ii. p. 337, fig. (1881); *Doderl. Man. Ittiol. Mediterr.* iv. p. 23 (1889); *Bellotti, Atti Soc. Ital. Sc. Nat.* xxxiii. 1891, p. 121.

Labrax orientalis, *Günth. l. c.*

Labrax schoenleinii, *Peters, Mon. Berl. Ac.* 1865, p. 95, and 1866, p. 512.

Dicentrarchus orientalis, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 425.

Dicentrarchus punctatus, *Jord. & Eigenm. l. c.* p. 426.

D. IX, I 12–14. A. III 11–12. Sc. 60–65 $\frac{8-10}{14-17}$.

Very closely allied to the preceding, but easily distinguished by the presence of a more or less elongate backward process on the median line of the group of vomerine teeth; the larger eye, which is but slightly shorter than the snout and $\frac{1}{4}$ or $\frac{2}{5}$ the length of the head in the adult; and the larger scales. Besides, the scales on the top of the head are cycloid in *D. labrax*, ctenoid in the present species. Upper half of the body constantly spotted with black.

Total length 360 millim.



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Atlantic coasts of Europe and Africa, from Normandy to Senegambia; Mediterranean.

| | | |
|---|---|---|
| *a–b*. Ad. | Portugal. | Prof. Barboza du Bocage [P.]. |
| *c*. Hgr. | Gibraltar. | P. L. Sclater, Esq. [P.]. |
| *d e*. Hgr. | Alexandria. | Consul Petherick [C.]. (Types of *L. orientalis*.) |

## 6. PERCALATES.

Percalates, *Ramsay & Douglas-Ogilby, Proc. Linn. Soc. N.S.W.* (2) ii. 1887, p. 182.

Body compressed; scales rather large, cycloid, concentrically striated. Lateral line complete, the tube straight and not extending to the extremity of the scale. Mouth large, protractile; maxillary exposed, with supplemental bone; villiform teeth in jaws and on vomer and palatines; tongue smooth; head partly naked; præopercle serrated, the spines on the lower border antrorse; opercle with two spines. Gill-membranes separate; six branchiostegals; pseudobranchiæ present; gill-rakers long. Two dorsals, connected at the base, with VIII–IX, I 9–10 rays, the spinous longer than the soft. Anal short, with III 7–9 rays. Caudal emarginate. Pectorals asymmetrical, obtusely pointed, with 14 or 15 rays, upper longest. Ventrals below or slightly behind base of pectorals, close together, with a strong spine. Posterior processes of præmaxillaries not extending to the frontals; parietal and supraoccipital bones not extending to between postfrontal processes; supraoccipital crest strong, not produced on the frontals. Vertebræ 25 (11+14).

Fresh waters and mouths of rivers of South-eastern Australia.

### 1. Percalates colonorum.

Lates colonorum, *Günth. Ann. & Mag. N. H.* (3) xi. 1863, p. 114, *and Zool. Rec.* 1866, p. 140; *Casteln. Proc. Zool. Soc. Vict.* i. 1872, p. 43; *McCoy, Prodr. Zool. Vict.*, Dec. 2, pl. xiv. (1878); *Macleay, Proc. Linn. Soc. N.S.W.* v. 1880, p. 304; *Klunz. Sitzb. Ak. Wien*, lxxx. i. 1880, p. 342; *Tenison-Woods, Fish. N.S.W* p. 31, pl. i. (1882).

Dules novemaculeatus, *Steind. Sitzb. Ak. Wien*, liii. i. 1866, p. 428, pl. i. fig. 2, and lx. i. 1869, p. 674; *Klunz. Arch. f. Nat.* 1872, p. 20.

Dules reinwardti, *Steind. Sitzb. Ak. Wien*, lvi. i. 1867, p. 320.

? Lates similis, *Casteln. l. c.* p. 44.

Lates antarcticus, *Casteln. l. c.*

Lates victoriæ, *Casteln. l. c.* p. 45.

Lates ramsayi, *Macleay, Proc. Linn. Soc. N.S.W.* v. 1880, p. 306; *Douglas-Ogilby, Cat. Fish. N.S.W.* p. 5 (1887).

D. VIII–IX, I 9–10. A. III 7–9. Sc. 50–55 $\frac{8-10}{18-24}$; l. l. 50–55.

Shape variable, upper profile of head sometimes concave; depth

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of body $2\frac{1}{2}$ to 3 times in total length, length of head $2\frac{3}{4}$ to $3\frac{1}{4}$ times. Diameter of eye equal to or a little shorter than length of snout, 4 to 5 times in length of head; interorbital space wide; lower jaw slightly projecting; maxillary extending to below centre or posterior third of eye, the width of its distal extremity $\frac{3}{5}$ to $\frac{3}{4}$ diameter of eye; præ- and suborbital serrated; cheeks and opercles scaly; serræ on lower border of præopercle moderately developed; lower opercular spine strong. Gill-rakers longer than gill-fringes, 16 on lower part of anterior arch. Dorsal originating just behind vertical of axilla; first and second spines short, fourth longest, about half as long as head, as long as or a little longer than the longest soft rays; first dorsal $1\frac{1}{3}$ to $1\frac{1}{2}$ length of second. Pectoral about $\frac{3}{5}$ length of head. Anal spines strong, second and third nearly equal and intermediate in length to the sixth and seventh dorsal spines. Middle caudal rays $\frac{3}{5}$ to $\frac{2}{3}$ length of outer. Olive above, silvery below; ventrals and anal and extremity of opercle each with a black blotch, most distinct in the young.

Total length 420 millim.

New South Wales and Victoria.

| | | |
|---|---|---|
| *a*. Ad., stffd. | Victoria. | (Type.) |
| *b*, *c*–*e*. Ad., hgr., & yg. | Hawkesbury R., N. S. Wales. | G. Krefft, Esq. [P.]. |
| *f*–*h*. Ad. | Sydney Market. | Imperial Institute [P.]. |
| *i*. Ad., skel. | Sydney Market. | Imperial Institute [P.]. |

## 7. CTENOLATES.

Dules, part., *Günth. Cat.* i. p. 266 (1859).

Plectroplites, *Gill, Proc. Ac. Philad.* 1862, p. 236 (no definition); *Bleek. Arch. Néerl.* xi. 1876, p. 267.

Ctenolates, *Günth. Proc. Zool. Soc.* 1871, p. 320; *Ramsay & Douglas-Ogilby, Proc. Linn. Soc. N. S. W.* (2) ii. 1887, p. 183.

Body compressed; scales small, finely denticulated, concentrically striated. Lateral line complete, the tube straight and not extending to the extremity of the scale. Mouth moderate, protractile; maxillary exposed, with supplemental bone, its upper border nearly entirely slipping under the præorbital; villiform teeth in jaws, on vomer, and on palatines; tongue smooth; head partly naked, with large muciferous cavities; præopercle serrated, the spines on the lower border antrorse; opercle with two spines. Gill-membranes separate; six or seven branchiostegals; pseudobranchiæ present; gill-rakers long. A single dorsal, with X 10–11 rays, the spinous portion longer than the soft. Anal short, with III 7–9 rays. Caudal rounded. Pectorals subsymmetrical, rounded, rays 16. Ventrals below base of pectorals, close together, with a strong spine. Præmaxillary processes not extending to the frontals; parietal and supraoccipital bones not extending to between post-

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frontal processes; supraoccipital crest strong, not produced on the frontals. Vertebræ 26 (11+15).

Rivers of South-eastern Australia.

### 1. Ctenolates ambiguus.

Datnia ? ambigua, *Richards. Zool. Ereb. & Terr., Ichth.* p. 25, pl. xix. (1844).
Dules ambiguus, *Günth.* i. p. 270 (1859); *Klunz. Sitzb. Ak. Wien*, lxxx. i. 1880, p. 348.
Ctenolates macquariensis, *Günth. Proc. Zool. Soc.* 1871, p. 320, pl. xxxiii., *and Zool. Rec.* 1871, p. 96 (1873).
Dules auratus, *Casteln. Proc. Zool. Soc. Vict.* i. 1872, p. 55.
Dules flavescens, *Casteln. Res. Fish. Austral.* p. 10 (1875).
Plectroplites ambiguus, *Bleek. Arch. Néerl.* xiv. 1876, p. 267.
Ctenolates ambiguus, *Günth. Zool. Challeng.* vi. *Shore Fish.* p. 32 (1880); *Macleay, Proc. Linn. Soc. N. S. W.* v. 1880, p. 354; *Tenison-Woods, Fish. N. S. W.* p. 103 (1882).
Ctenolates flavescens, *Macleay, l. c.* p. 355.

D. X 10–11. A. III 7–9. Sc. 75–88 $\frac{12-14}{30-36}$; l. l. 52–63.

Body more or less gibbous anteriorly, its greatest depth $2\frac{1}{2}$ to $3\frac{1}{2}$ times in the total length; head with more or less concave upper profile, its length $2\frac{3}{4}$ to $2\frac{1}{2}$ times in the total length. Eye about $\frac{2}{3}$ length of snout (in adult), $4\frac{1}{2}$ (young) to 6 times (adult) in length of head; interorbital space wide; lower jaw projecting; maxillary extending to below centre of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præ- and suborbital serrated; cheeks and opercles scaly; serræ on lower border of præopercle moderately developed, usually forming an interrupted series; lower opercular spine strong. Gill-rakers as long as gill-fringes, 13 or 14 on lower part of anterior arch. Dorsal originating above or a little behind vertical of axilla; spines very strong, increasing in length to the fourth or fifth, which measures $\frac{2}{5}$ to $\frac{1}{2}$ length of head; soft portion $\frac{2}{3}$ to $\frac{3}{5}$ length of spinous. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head. First ventral ray produced. Anal spines strong, second and third equal and about as long as third dorsal spine. Caudal rounded. Olive or green above, sides golden; belly sometimes red, usually white.

Total length 500 millim.

Darling and Murray River Systems; West Australia?

| | | |
|---|---|---|
| *a, b.* Ad. & hgr., stffd. | W. Australia. | Sir G. Grey [P.]. (Types.) |
| *c.* Ad. | Macquarie R. | G. Krefft, Esq. [P.]. (Type of *Ctenolates macquariensis.*) |
| *d.* Ad. | Sydney Market. | Australian Museum [E.]. |
| *e.* Ad., stffd. | N. S. Wales. | Australian Museum [E.]. |
| *f.* Ad. | Hutton Creek, Fitzroy R., S. Queensland. | J. J. Lister, Esq. [P.]. |
| *g–h.* Hgr. & yg. | Queensland, 400 miles inland of Brisbane. | H.M.S. 'Challenger.' |
| *i.* Ad., skel. | Sydney Market. | Australian Museum [E.]. |

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## 8. MACQUARIA.

Macquaria, *Cuv. & Val.* v. p. 377 (1830); *Günth. Cat.* i. p. 285 (1859); *Bleek. Arch. Néerl.* xi. 1876, p. 268; *Ramsay & Douglas-Ogilby, Proc. Linn. Soc. N. S. W.* (2) ii. 1887, p. 183.
Murrayia, *Casteln. Proc. Zool. Soc. Vict.* i. 1872, p. 61.
Riverina, *Casteln. l. c.* p. 64.

Body compressed; scales rather large, rough, and ciliated. Lateral line complete, the tube straight and occupying nearly the whole length of the scale. Mouth rather small, protractile; maxillary nearly entirely retractile under the præorbital, small, with supplemental bone; minute villiform teeth in jaws; similar teeth on vomer and a few on palatines; tongue smooth; head scaly on the sides, with large muciferous cavities; præopercle serrated, the spines on the lower border antrorse; opercle with two spines. Gill-membranes separate; six branchiostegals; pseudobranchiæ present; gill-rakers short, obtuse. A single dorsal, with X–XII 11–12 rays, the spinous portion longer than the soft. Anal short, with III 8 rays. Caudal rounded. Pectorals subsymmetrical, rounded, with 16 rays. Ventrals below base of pectorals, close together, with a strong spine.

Rivers of South-eastern Australia.

Closely allied to the preceding genus, but distinguished by the smaller mouth and the larger scales.

### 1. Macquaria australasica *.

Macquaria australasica, *Cuv. & Val.* v. p. 377, pl. cxxxi. (1830); *Lesson, Voy. Coquille, Zool.* ii. p. 194, pl. xiv. fig. 1 (1830); *Günth.* i. p. 286 (1859); *Klunz. Sitzb. Ak. Wien*, lxxx. 1880, p. 352.
? Dules viverrinus, *Krefft, Proc. Zool. Soc.* 1867, p. 943.
Dules christyi, *Casteln. Proc. Zool. Soc. Vict.* i. 1872, p. 57.
Murrayia guentheri, *Casteln. l. c.* p. 61.
Murrayia cyprinoides, *Casteln. l. c.* p. 62.
Murrayia bramoides, *Casteln. l. c.* p. 63.
Riverina fluviatilis, *Casteln. l. c.* p. 64.
? Murrayia riverina, *Macleay, Proc. Linn. Soc. N. S. W.* v. 1880, p. 358.
? Murrayia jenkinsi, *Macleay, op. cit.* x. 1885, p. 268.

D. XI–XII (rarely X) 11–12. A. III 8. Sc. 50–60 $\frac{7-10}{17-20}$; l.l. 50–60.

Depth of body nearly equal to length of head, $\frac{1}{3}$ total length. Head with slightly concave upper profile, its length $3\frac{1}{4}$ times in total length; diameter of eye equal to or a little less than length of snout, 4 times in length of head; interorbital region convex, its width $3\frac{1}{2}$ times in length of head; lower jaw included; maxillary extending to below anterior border of eye, the width of its distal

* I have examined the type specimens (Paris Mus., nos. 7743, 7744) and three skins sent by Castelnau to the Paris Museum (nos. 5625, 5642) as *Macquaria guentheri* and *Riverina fluviatilis*. The specimen labelled *Macquaria guentheri* has only 10 dorsal spines, and these are shorter than usual, the longest not being quite half as long as the head.

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extremity $\frac{1}{3}$ diameter of eye; cheeks and opercles with rather large ciliated scales; præopercular border serrated, the serræ enlarged at the angle and on the lower border, the latter being directed forwards: opercular spines moderate. Gill-rakers hardly half as long as gill-fringes, 12 or 13 on lower part of anterior arch. Dorsal originating above axilla; spines strong, fourth and fifth longest, $\frac{1}{2}$ to $\frac{3}{5}$ length of head, last nearly as long as third; soft portion about half length of spinous. Pectoral $\frac{2}{3}$ length of head. First ventral ray produced. Second anal spine very strong, a little longer than third, $\frac{2}{5}$ to $\frac{1}{2}$ length of head. Caudal rounded. Uniform brown; in life olive or purplish brown above, whitish or pink beneath; ventrals rosy, with a blackish blotch.

Total length 160 millim. The largest specimen in the Paris Museum measures 230 millim. The species is said to grow to 350 millim.

Murray River and its tributaries.

*a*. Hgr. Port Philip. Stuttgart Mus. [E.].

## 9. SINIPERCA.

Siniperca, *Gill, Proc. Ac. Philad.* 1862, p. 16; *Kner, Novara, Fische*, p. 14 (1865); *Bleek. Arch. Néerl.* xi. 1876, p. 255.
Plectroperca, *Peters, Mon. Berl. Ac.* 1864, p. 121.
Actenolepis, *Dybowski, Verh. zool.-bot. Ges. Wien*, xxii. 1872, p. 210.

Body compressed; scales very small, cycloid, concentrically striated. Lateral line complete, the tube straight and extending along the whole length of the scale. Mouth large, protractile; maxillary exposed, with supplemental bone; villiform teeth in jaws and on vomer and palatines; some of the teeth in the jaws more or less enlarged and canine-like, except in old specimens; tongue smooth; head partly naked; præopercle serrated, with a few strong antrorse spines on the lower border; opercle ending in a spine. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers moderate or rather short. Dorsal fins confluent, with XII–XIII 11–15 rays, the spinous portion much longer than the soft. Anal short, with III 9–10 rays. Caudal rounded. Pectorals symmetrical, rounded, with 16–17 rays. Ventrals below or slightly behind the pectorals, close together, with a strong spine. Posterior processes of præmaxillaries not extending to the frontals; posterior part of cranium smooth and convex; parietal and supraoccipital bones not extending to between postfrontal processes; supraoccipital crest short, not extending on upper surface of cranium. Vertebræ 28 (13+15).

Rivers of China, Mantchuria, and Japan.

### 1. Siniperca chuatsi.

Perca chua-tsi, *Basilewsky, N. Mém. Soc. Nat. Mosc.* x. 1855, p. 218, pl. i. fig. 1.
Perca chuan-tsi, *Basil. l. c.* pl. ii. fig. 1.

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Siniperca chua-tsi, *Gill, Proc. Ac. Philad.* 1862, p. 16; *Kner, Novara, Fische*, p. 15, pl. i. fig. 3 (1865); *Günth. Zool. Rec.* 1864, p. 150 (1865); *Dabry de Thiersant, Pisc. en Chine*, pl. xxxvi. fig. 4 (1872); *Herzenst. & Warpach. Trud. St. Petersb. Nat.* xviii. 1887, p. 16.
Plectroperca berendti, *Peters, Mon. Berl. Ac.* 1864, p. 121.
Siniperca matsaki, *Guichen. in Dabry, l.c.* fig. 5, *and Ann. Sc. Nat.* (6) i. 1874, art. 5, p. 1.
Actenolepis ditmarii, *Dybowski, Verh. zool.-bot. Ges. Wien*, xxii. 1872, p. 210.
Siniperca muatsi, *Bleek. Verh. Akad. Amst.* xviii. no. 5, 1879, p. 4.

D. XII–XIII 12–15. A. III 9–10. Sc. 150–180 $\frac{28-30}{75-85}$; l.l. 108–120.

Greatest depth at origin of dorsal fin, $2\frac{3}{4}$ to $3\frac{1}{3}$ times in total length, length of head $2\frac{3}{5}$ to 3 times. Diameter of eye less than length of snout, $\frac{1}{4}$ (young) to $\frac{1}{3}$ (adult) length of head; interorbital width at least equal to diameter of orbit in the adult, less in the young; lower jaw strongly projecting; maxillary extending to below posterior border of eye in the young, beyond in the adult, in which the width of its distal extremity equals the diameter of the eye; canine teeth not much developed, becoming indistinct in old specimens; præorbital entire; cheeks naked or scaly; opercles scaly; præopercle with two or three strong spines at the angle and two at the lower border; opercular spine strong. Gill-rakers nearly as long as gill-fringes, 5 or 6 (and some rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral; spinous portion $2\frac{1}{2}$ to 3 times as long as the soft; spines strong, increasing in size to the fourth or fifth, which measures $\frac{2}{3}$ to $\frac{1}{2}$ length of head, and equals the longest soft rays. Pectoral half length of head. Anal spines very strong, first shortest, second longest and nearly equal to the third dorsal spine. Caudal rounded. Brown or olive, with irregular dark brown spots; young with a dark brown vertical band below the sixth and seventh or seventh and eighth dorsal spines; a dark brown streak on each side of the head and nape, passing through the eye; dorsal, anal, and caudal fins with deep black spots.

Total length 550 millim.

Rivers of China and Mantchuria, from the Amour to the Yang-tse-kiang; Japan.

| | | |
|---|---|---|
| *a–b.* Ad. & yg. | Kiu Kiang. | F. W. Styan, Esq. [C.]. |
| *c.* Yg. | Shanghai. | R. Swinhoe, Esq. [C.]. |
| *d.* Yg. | Shanghai. | Shanghai Museum. |
| *e.* Yg. | Japan. | |
| *f.* Ad., skel. | Kiu Kiang. | F. W. Styan, Esq. [C.]. |

## 2. Siniperca scherzeri.

Siniperca chuantsi (*non Basil.*), *Günth. Ann. & Mag. N. H.* (4) xii. 1873, p. 240.
Siniperca scherzeri, *Steind. Anz. Ak. Wien*, 1892, p. 130, *and Denkschr. Ak. Wien*, lix. 1892, p. 357, pl. i. fig. 1.

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D. XIII 11–12. A. III 9. Sc. 130–150 $\frac{21-26}{70-73}$; l. l. 95–106.

Depth of body $3\frac{1}{2}$ to $3\frac{2}{3}$ times in total length; nape not elevated. Length of head $2\frac{2}{5}$ to $2\frac{3}{4}$ times in total; diameter of eye $\frac{2}{5}$ length of snout, $\frac{1}{5}$ length of head; interorbital width $\frac{3}{4}$ diameter of eye; lower jaw strongly projecting; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{1}{2}$ diameter of eye; canine teeth strongly developed at the front of the præmaxillaries and on the back of the mandible; præorbital entire; cheeks and opercles scaly; eight to ten spines on the posterior border of the præopercle, two at the angle, and two on the lower border; opercular spine strong. Gill-rakers shorter than gill-fringes, 4 or 5 (and some rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral; spinous portion $2\frac{1}{2}$ times as long as the soft; spines increasing in size to the sixth, which measures $\frac{1}{4}$ to hardly $\frac{1}{3}$ length of head, and is considerably shorter than the longest soft rays. Pectoral half length of head. Anal spines very strong, first shortest, second longest, as long as and much stronger than the longest dorsal spine. Brown, with darker spots and annuli; dorsal, anal, and caudal fins with black spots.

Total length 165 millim.*

Mouth of the Yang-tse-kiang.

*a–b*. Ad. Shanghai. R. Swinhoe, Esq. [C.].

### 3. Siniperca? kawamebari.

Serranus kawamebari, *Temm. & Schleg. Faun. Japon., Pisc.* p. 5 (1844); *Günth.* i. p. 107 (1859).

D. XII 12. A. III 9.

This species, very imperfectly described by Schlegel, should perhaps be referred to this genus, with which it agrees in the fin-formula and the cycloid scales on the body †; but it differs in the larger scales and the presence of but one spine on the lower border of the præopercle. Opercle with two strong spines. Canine teeth feeble. Brownish, with five darker cross-bands; the soft dorsal, the caudal, and the anal with small round spots; two brown streaks from the eye to the border of the præopercle; a deep black spot between the two opercular spines.

Total length 87 millim.

Japan.

The genus *Odontolabrax* was established by Bleeker, Nederl. Tijdschr. Dierk. iv. 1873, p. 149, for a fish known from a Chinese drawing in the same collection as yielded the *Lepidosteus sinensis*, Blkr., which has not been re-discovered. The genus *Odontolabrax*,

* Female with ripe ova.

† As Dr. Reuvens kindly informs me after re-examination of the type specimen in the Leyden Museum.

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which may be placed near *Siniperca*, is thus characterized:—"Corpus oblongum. Pinna dorsalis unica profunde incisa, parte spinosa spinis 9. Maxillæ antice dentibus caninis. Præoperculum angulo spina postrorsum directa. Pinna caudalis emarginata, biloba. Squamæ magnæ."

*O. typus*, Blkr. "Corpore altitudine $3\frac{2}{3}$ circ. in ejus longitudine. Oculi magni. Corpus fasciis 9 transversis nigricantibus spatiis intermediis non multo latioribus, fasciis 2 anterioribus nucho-opercularibus, fasciis 3 sequentibus dorso-ventralibus, fasciis 6ª et 7ª dorso-analibus, ceteris caudalibus; operculo superne ocello magno cærulescente pupilla nigricante. D. 9/15? Squamæ 34? in linea laterali."

Another fish from China, which has not been recognized, is *Labrax ly-iuy*, Basilewsky, N. Mém. Soc. Nat. Mosc. (2) x. 1855, p. 219. The number of dorsal rays is not given.

## 10. ACANTHISTIUS.

Plectropoma, part., *Cuv. & Val.* ii. p. 387 (1828); *Günth. Cat.* i. p. 156 (1859); *Vaill. Miss. Sc. Mex., Poiss.* p. 94 (1877).

Acanthistius, *Gill, Proc. Ac. Philad.* 1862, p. 236; *Bleek. Arch. Néerl.* xi. 1876, p. 256; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 347.

Body compressed; scales very small, cycloid or ciliated. Lateral line complete, the tubes bi- or trifurcate. Mouth large, protractile; maxillary exposed, with supplemental bone; jaws with broad bands of villiform teeth and an outer series of large conical, canine-like teeth; teeth on vomer and palatines; tongue smooth; head scaly; præopercle serrated, with strong antrorse spines on the lower border; opercle with three strong spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers long and strong. A single dorsal, with XI–XIII 15–18 rays, the spinous portion longer than the soft, which is scaly at the base. Anal short, scaly at the base, with III 7–9 rays. Caudal truncate or rounded. Pectorals subsymmetrical, rounded, with 19–21 rays. Ventrals below or slightly behind base of pectorals, close together, with a strong spine. Posterior processes of præmaxillaries not extending to the frontals; supraoccipital crest not produced on the frontals. Vertebræ 26 (10+16).

South Pacific and South Atlantic Oceans.

This genus may be divided into two subgenera, based on the conformation of the skull combined with the number of dorsal spines.

### *Synopsis of the Species.*

I. Dorsal spines eleven; supraoccipital and parietal crests very strong, the latter converging forwards, and extending to between postfrontal processes (*Pseudalphestes*).

Dorsal with 17 or 18 soft rays; Sc. 130–160 $\frac{25-28}{65-67}$.

1. *pictus*, p. 140.

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II. Dorsal with twelve or thirteen spines; skull smooth and convex behind the orbits, the supraoccipital and parietal bones short and not extending to between postfrontal processes (*Acanthistius*).

A. Dorsal with 12 spines; scales ciliated, 90–105 $\frac{17-18}{45-50}$.
2. *sebastoides*, p. 141.

B. Dorsal with 13 spines; scales ciliated.

1. Snout not longer than diameter of eye.

Sc. 100–105; l. l. 55–60; snout as long as diameter of eye ..... 3. *brasilianus*, p. 141.

Sc. 100; l. l. 68; snout a little shorter than diameter of eye ..... 4. *patachonicus*, p. 142.

2. Snout longer than diameter of eye; Sc. 115 $\frac{20}{60}$; l. l. 60.
5. *cinctus*, p. 142.

C. Dorsal with 13 spines; scales mostly cycloid, 90–110 $\frac{20-22}{55-60}$; l. l. 60–67.
6. *serratus*, p. 143.

## 1. Acanthistius pictus.

Plectropoma pictum, *Tschudi, Faun. Per., Ichth.* p. 5 (1845); *Günth.* i. p. 164 (1859); *Kner, Sitzb. Ak. Wien*, lvi. i. 1867, p. 710.
Alphestes pictus, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 395; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 350.

D. XI 17–18. A III 8–9. Sc. 130–160 $\frac{25-28}{65-67}$; l. l. 60–62.

Depth of body $2\frac{1}{2}$ times in total length, length of head $2\frac{1}{2}$ to $2\frac{4}{5}$ times. Snout $1\frac{1}{2}$ to 2 times as long as diameter of eye, which is 6 to 7 times in length of head; interorbital width 7 times in length of head; lower jaw slightly projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity equal to diameter of eye; præopercle serrated behind, with two or three strong antrorse teeth on its lower border; opercle with three strong spines, median nearer lower than upper; head nearly entirely covered with small scales, including maxillary. Gill-rakers a little shorter than gill-fringes, 13 or 14 on lower part of anterior arch. Dorsal originating above upper opercular spine; spines rather short, third to fifth longest, about $\frac{1}{4}$ length of head, $\frac{3}{5}$ to $\frac{2}{3}$ length of longest soft rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head, as long as or a little longer than ventral. Second and third anal spines equal, as long as longest dorsal. Caudal truncate. Scales strongly ciliated. Brown (in life silvery grey with red markings); skin between the two upper opercular spines blackish.

Total length 350 millim.

Coasts of Chili and Peru.

| | | |
|---|---|---|
| *a*. Ad. | Chili. | Museum Godeffroy. |
| *b*. Ad. | Chili. | Government of Chili [P.]. |
| *c*. Skeleton. | Chili. | Government of Chili [P.]. |

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### 2. Acanthistius sebastoides.

Plectropoma brasilianum (*non C. & V.*), *Günth.* i. p. 164 (1859).
Serranus cuvieri (*non Smith*), *Casteln. Mém. Poiss. Afr. Austr.* p. 2 (1861).
Serranus sebastoides, *Casteln. l. c.* p. 3.
Plectropoma sebastoides, *Steind. Sitzb. Ak. Wien*, lxxxiii. 1881, p. 201, pl. i.

D. XII 15–16. A. III 7–8. Sc. 90–105 $\frac{17-18}{45-50}$; l. l. 55–60.

Depth of body 2½ to 3 times in total length, length of head 2¾ to 3 times. Snout as long as diameter of eye, which is 4 to 4½ times in length of head; interorbital width 5½ to 6 times in length of head; jaws subequal; maxillary extending to below posterior third or posterior border of eye, the width of its distal extremity ⅔ diameter of eye; præopercle rounded, posterior border serrated, lower border with three strong antrorse spines; opercle with three strong spines, median nearer lower than upper; snout, maxillary, and mandible with minute imbedded scales, rest of head covered with small scales. Dorsal originating above axilla; spines increasing in length to the third or fourth, which is about ¼ length of head and ¾ length of longest soft rays. Pectoral ½ to ⅔ length of head. Ventral shorter. Second and third anal spines equal, a little longer than longest dorsals. Caudal truncate. Scales ciliated. Brown, with darker marblings and numerous orange dots.

Total length 280 millim.

Coast of South Africa.

*a, b, c.* Ad. & hgr., skins. Cape Seas. Sir A. Smith [P.].

### 3. Acanthistius brasilianus *.

Plectropoma brasilianum, *Cuv. & Val.* ii. p. 397 (1828).
Plectropoma aculeatum, *Cuv. & Val.* vi. p. 523 (1830); *Günth.* i. p. 163 (1859).
Acanthistius brasilianus, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 348.

D. XIII 15–16. A. III 7–8. Sc. 100–105 $\frac{17-18}{45-47}$; l. l. 55–60.

Depth of body nearly equal to length of head, 2½ to 3 times in total length. Snout as long as diameter of eye, which is 4 to 4½ times in length of head; interorbital width 5½ to 6½ times in length of head; jaws equal; maxillary extending to below posterior third or posterior border of eye, the width of its distal extremity ⅔ to ¾ diameter of eye; præopercle rounded, serrated behind, with two or three strong antrorse spines below; adult with three small sharp points on the subopercle; opercle with three strong spines, median nearer lower than upper. Gill-rakers long and slender, a little longer than gill-fringes, 14 or 15 on lower part of anterior arch. Dorsal originating above base of pectoral; fourth and fifth spines

* Described from the type specimens of *P. brasilianum* (Paris Mus. nos. 4540, 6407) and *P. aculeatum* (Paris Mus. no. 7675).

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longest, $\frac{2}{3}$ length of head, a little shorter than longest soft rays, which are twice as long as last dorsal spine. Pectoral $\frac{3}{4}$ to $\frac{4}{5}$ length of head, longer than ventral. Second anal spine longest and strongest, as long as longest dorsal. Caudal rounded. Scales strongly ciliated. Brown, uniform or with small darker spots.

Total length 400 millim.

Coast of Brazil.

### 4. Acanthistius patachonicus.

Plectropoma patachonica, *Jenyns, Zool. Beagle, Fish*, p. 11 (1842).
Acanthistius patachonicus, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 349.

D. XIII 15. A. III 7–8. Sc. 100; l. l. 68.

Depth of body $2\frac{3}{5}$ times in total length, length of head $2\frac{1}{2}$ times. Snout a little shorter than diameter of eye, which is $4\frac{1}{5}$ times in length of head; jaws subequal; maxillary scaleless, reaching to below posterior third of eye; præopercle strongly and sharply serrate, the teeth larger below, with two strong antrorse spines on the lower border; opercular spines small. Gill-rakers long and slender, 13 on lower border of anterior arch. Longest dorsal spine $\frac{2}{3}$ length of head, shorter than longest soft ray. Pectoral $\frac{2}{3}$ length of head. Second anal spine as long as longest dorsal. Caudal truncate. Scales roughish. Brown, covered with darker reticulations.

Total length 380 millim.

East coast of Patagonia, northwards to Uruguay.

### 5. Acanthistius cinctus. (Plate I.)

Plectropoma cinctum, *Günth.* i. p. 162 (1859).

D. XIII 15. A. III 8. Sc. 115 $\frac{20}{60}$; l. l. 60.

Depth of body $2\frac{3}{4}$ times in total length, length of head $2\frac{1}{2}$ times. Snout $1\frac{1}{2}$ times as long as diameter of eye, which is $5\frac{1}{2}$ times in length of head; interorbital width 7 times in length of head; lower jaw slightly projecting; maxillary extending to below posterior fourth of eye, the width of its distal extremity $\frac{3}{4}$ diameter of eye; præopercle serrated behind, with three strong antrorse teeth on the lower border; opercle with three strong spines, median nearer lower than upper; head nearly entirely covered with small scales; scales on maxillary minute. Gill-rakers as long as gill-fringes, 10 (and some rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral; fifth and sixth spines longest, $\frac{1}{3}$ length of head, as long as longest soft rays; last spine as long as second. Pectoral $\frac{1}{2}$ length of head, longer than ventral. Second anal spine longest and strongest, longer than longest dorsal. Caudal rounded. Scales strongly ciliated. Reddish brown, with six dark brown cross-bands; three dark brown stripes on each side of the head, the upper from behind the eye to the origin of the lateral line, the second from below the eye to the

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angle of the præopercle, the third from below the prærorbital to a little beyond the maxillary; soft fins dark brown at the end, with a whitish border.

Total length 235 millim.

Norfolk Island, South Pacific Ocean.

| | | | |
|---|---|---|---|
| *a*. Ad. | Norfolk Island. | Haslar Collection. | (Type.) |

### 6. Acanthistius serratus.

Plectropoma serratum, *Cuv. & Val.* ii. p. 399 (1828); *Quoy & Gaim. Voy. Astrol., Zool.* iii. p. 662, *Poiss.* pl. ii. fig. 1 (1834); *Günth.* i. p. 163 (1859); *Casteln. Proc. Linn. Soc. N. S. W.* iii. 1878, p. 368.

Plectropoma cyanostigma (*non Bleek.*), *Günth. t. c.* p. 161.

Plectropoma ocellatum, *Günth. t. c.* p. 504, *and Zool. Rec.* 1866, p. 140, *and in Brenchley, Curaçoa*, p. 416, pl. xxix. (1878).

Plectropoma myriaster, *Steind. Sitzb. Ak. Wien*, liii. 1866, p. 426, pl. i. fig. 3.

Acanthistius serratus, *Bleek. Arch. Néerl.* xi. 1876, p. 256.

D. XIII 15-16. A. III 8-9. Sc. 90-110 $\frac{20-22}{55-60}$; l. l. 60-67.

Depth of body nearly equal to length of head, $2\frac{1}{2}$ to 3 times in total length. Snout $1\frac{1}{2}$ to $1\frac{2}{3}$ times as long as diameter of eye, which is 5 to $5\frac{1}{2}$ times in length of head; interorbital width 6 to 8 times in length of head; lower jaw slightly projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity equal to or a little less than diameter of eye; præopercle serrated behind, with two or three strong antrorse teeth on its lower border; opercle with three strong spines, median nearer lower than upper; head nearly entirely covered with small scales, including maxillary. Gill-rakers nearly as long as gill-fringes, 9 or 10 (and some rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral or axilla; fourth to sixth spines longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, as long as or slightly shorter than longest soft rays; last spine intermediate between first and second. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head, longer than ventral. Second anal spine longest, as long as or a little shorter than longest dorsal. Caudal truncate. Scales mostly cycloid. Brown, with more or less numerous small round blackish spots.

Total length 440 millim.

East coast of Australia.

| | | | |
|---|---|---|---|
| *a*. Ad., stffd. | Australia. | J. Gould, Esq. [C.]. | (Types of *P. cyanostigma* = *ocellatum*.) |
| *b*, *c*. Ad., skins. | Australia. | H.M.S. 'Fly.' | |
| *d*, *e*. Ad., skins. | Australia. | | |
| *f*. Ad., skin. | Port Jackson. | J. Gould, Esq. [C.]. | |
| *g*. Hgr. | Port Jackson. | Imperial Institute [P.]. | |
| *h*. Ad. | New South Wales. | G. Krefft, Esq. [P.]. | |
| *i*. Ad., stffd. | New South Wales. | | |
| *k*. Hgr., skel. | New South Wales. | G. Krefft, Esq. [P.]. | |

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## 11. POMODON.

Plectropoma, part., *Günth. Cat.* i. p. 156 (1859).
Hemilutjanus, *Bleek. Arch. Néerl.* xi. 1876, p. 277; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 344.

Body compressed; scales very small, feebly ciliated. Lateral line complete, the tubes straight and partly concealed under the neighbouring scales. Mouth large, protractile; maxillary exposed, with supplemental bone; jaws with bands of villiform teeth; teeth on vomer and palatines; tongue smooth; head scaly; præopercle serrated, with antrorse spines on the lower border; opercle with two spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ psesent; gill-rakers long and slender. A single dorsal, with X 10 rays, the spinous portion longer than the soft, which is scaly at the base. Anal short, with III 9 rays, scaly at the base. Caudal truncate or slightly emarginate. Pectorals asymmetrical, pointed, with 17 rays, upper longest. Ventrals below base of pectorals, close together, with a strong spine. Posterior processes of præmaxillaries not extending to the frontals; parietal and supraoccipital bones extending to between posterior part of orbits; a transverse ridge on the frontals posteriorly, connecting the parietal and supraoccipital crests, which are very strong. Vertebræ 25 (10 + 15).

Coasts of Chili and Peru.

### 1. Pomodon macrophthalmus.

Plectropoma macrophthalmos, *Tschudi, Faun. Per., Ichth.* p. 6 (1845); *Günth.* i. p. 165 (1859); *Kner, Sitzb. Ak. Wien*, lvi. i. 1867, p. 711, pl. i.
Hemilutjanus macrophthalmos, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 345.

D. X 10. A. III 9. Sc. 115–120 $\frac{17-18}{40-45}$; l. l. 74–78.

Depth of body $2\frac{1}{3}$ to $2\frac{3}{4}$ times in total length, length of head $2\frac{1}{2}$ to $2\frac{4}{5}$ times. Eye large, its diameter exceeding length of snout, 3 to $3\frac{1}{2}$ times in length of head; interorbital width 5 times in length of head; lower jaw projecting; maxillary extending to below posterior third of eye, the diameter of its distal extremity $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye; præopercle finely serrated on its posterior border, with about 10 rather strong spines at the angle and on the lower border; two rather strong opercular spines; head nearly entirely covered with small scales, including the maxillary. Gill-rakers a little longer than gill-fringes, 20 or 21 on lower part of anterior arch. Dorsal originating above base of pectoral; fifth and sixth, or fourth, fifth, and sixth spines longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, as long as or a little shorter than longest soft rays. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head, a little longer than ventral. Third anal spine longest, nearly as long as third dorsal. Caudal truncate or

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slightly emarginate. Grey or brown above, silvery beneath; lateral line blackish.

Total length 240 millim.

Coasts of Chili and Peru.

| | | |
|---|---|---|
| *a*. Ad. | Chili. | Museum Godeffroy. |
| *b*. Skeleton. | Peru. | Mr. Whitely [C.]. |

## 12. PARASCORPIS.

Parascorpis, *Bleek. Arch. Néerl.* x. 1875, p. 380.

Body compressed; scales very small, ciliated. Lateral line complete, the tube straight and occupying the whole length of the scale. Mouth large, protractile; maxillary exposed, with supplemental bone (?); villiform teeth in jaws and on vomer and palatines. Head scaly; præorbital and præopercle finely serrated; opercle with a short, flat spine. Seven branchiostegals; pseudobranchiæ present. Dorsal single, with XII 15 rays, the spinous portion longer than the soft. Anal with III 14 rays, as long as the soft dorsal. Caudal notched. Soft vertical fins thickly covered with scales. Pectorals obtusely pointed, with 16 rays, upper longest. Ventrals behind base of pectorals, with a strong spine.

Coast of South Africa.

### 1. Parascorpis typus.

Parascorpis typus, *Bleek. Arch. Néerl.* x. 1875, p. 381, pl. vii.

D. XII 15. A. III 14. Sc. circa 130 $\frac{20}{55}$; l. l. 40.

Depth of body $2\frac{1}{5}$ times in total length, length of head nearly 3 times. Snout as long as diameter of eye, which is $3\frac{2}{3}$ times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{2}{3}$ diameter of eye; præopercle forming an obtuse angle, its border finely serrated throughout. Dorsal originating above base of pectoral; spines increasing in length to the fourth, which is $\frac{2}{7}$ length of head and as long as the soft rays; last spines a little shorter. Pectoral $\frac{3}{5}$ length of head, as long as ventral. Second anal spine longest, $\frac{1}{3}$ length of head, longer than soft rays. Caudal angularly notched. Uniform brown.

Total length 193 millim.

Cape of Good Hope.

## 13. TRACHYPOMA.

Trachypoma, *Günth. Cat.* i. p. 167 (1859); *Bleek. Arch. Néerl.* xi. 1876, p. 254.

Body compressed; scales very small, cycloid. Lateral line complete, the tubes with ascending tubule extending to the extremity of the scale. Mouth large, protractile: maxillary exposed, with



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supplemental bone; jaws with bands of villiform teeth; teeth on vomer and palatines; tongue smooth; anterior nostril with a fringed tentacle; head scaly, maxillary and mandible naked; præopercle serrated, with strong antrorse spines on the lower border; opercle with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers long. A single dorsal, with XII 13–14 rays, the spinous portion much longer than the soft, which is scaly at the base. Anal short, with III 6 rays, scaly at the base. Caudal rounded. Pectorals subsymmetrical, rounded, with 16 or 17 rays. Ventrals behind base of pectorals, close together, with a strong spine. Vertebræ 26 (11+15).

South Pacific Ocean.

### 1. Trachypoma macracanthus. (Plate II.)

Trachypoma macracanthus, *Günth.* i. p. 167 (1859).

D. XII 13–14. A. III 6. Sc. 90–97 $\frac{11-12}{35}$; l. l. 48–50.

Depth of body 2⅔ to 2¾ times in total length, length of head 2½ times. Snout ⅔ diameter of eye, which is 3 to 3½ times in length of head and nearly twice interorbital width; maxillary extending to below centre of eye, the width of its distal extremity ½ diameter of eye; three strong antrorse spines on lower border of præopercle, anterior largest; opercular spines moderate. Gill-rakers at least as long as gill-fringes, 14 or 15 on lower part of anterior arch. Dorsal originating on the nape; fourth spine longest, about ½ length of head, as long as or a little longer than longest soft rays; last spine as long as or a little shorter than second. Pectoral ⅔ length of head. Ventral a little shorter, reaching anus or a little beyond. Second anal spine very long and strong, as long as or a little longer than longest dorsal. Caudal rounded. Brownish olive, covered all over with round whitish black-edged specks.

Total length 180 millim.

Norfolk Island.

*a–b, c–d.* Ad. & hgr. Norfolk Island. Haslar Collection. (Types.)

## 14. CENTROGENYS.

Centropristes, part., *Cuv. & Val.* iii. p. 36 (1829).
Centrogenys, *Richards. Ann. & Mag. N. H.* ix. 1842, p. 120; *Bleek. Atl. Ichth.* vii. p. 67 (1876), *and Arch. Néerl.* xi. 1876, p. 257.
Myriodon, *Brisout de Barnev. Rev. Zool.* 1847, p. 133; *Günth. Cat.* i. p. 174 (1859); *Kner, Novara, Fische*, p. 38 (1865).

Body compressed; scales rather large, strongly ciliated. Lateral line complete, the tubes with ascending tubule extending to the extremity of the scale. Mouth large, protractile; maxillary exposed, with supplemental bone; jaws with bands of villiform teeth; teeth on vomer and palatines; tongue smooth; anterior nostril with a fringed tentacle; head scaly, maxillary and mandible naked; præopercle serrated, with strong antrorse spines on the lower border;

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opercle with a strong spine. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers very short; lower pharyngeals united. A single dorsal, with XIII–XIV 9–11 rays, the spinous portion much longer than the soft, which is scaly at the base. Anal short, with III 5 rays, scaly at the base. Caudal rounded. Pectorals subsymmetrical, rounded, with 13 or 14 rays. Ventrals behind base of pectorals, with a strong spine. Posterior processes of præmaxillary bones extending to the frontals; parietal and supraoccipital bones short, with feeble crests. Vertebræ 25 (11+14).

Indian and Western Pacific Oceans.

### 1. Centrogenys vaigiensis.

Scorpæna vaigiensis, *Quoy & Gaim. in Freycinet, Voy. Uranie et Physic., Zool.* p. 324, pl. lviii. fig. 1 (1824).
Centropristes scorpenoides, *Cuv. & Val.* iii. p. 48 (1829); *Richards. Ann. & Mag. N. H.* ix. 1842, p. 120.
Myriodon scorpenoides, *Brisout de Barnev. Rev. Zool.* 1847, p. 133; *Bleek. Nat. Tijdschr. Nederl. Ind.* ii. 1851, p. 480.
Myriodon waigiensis, *Günth.* i. p. 175 (1859); *Kner, Novara, Fische,* p. 38 (1865); *Bleek. Verh. Ak. Amst.* xiv. no. 2, 1873, p. 122; *Day, Fish. Ind.* p. 747 (1878), *and Faun. Ind., Fish.* i. p. 461, fig. (1889).
Sebastes stoliczkæ, *Day, Fish. Ind.* p. 148, pl. xxxvi. fig. 1 (1877).
Centrogenys waigiensis, *Bleek. Atl. Ichth.* vii. p. 68, pl. ccxcvii. fig. 1 (1876); *O'Shaughn. Zool. Rec.* 1876, *Pisc.* p. 10.

D. XIII–XIV 9–11. A. III 5. Sc. 42–45 $\frac{4-5}{14-16}$; l. l. 40–42.

Depth of body 2⅔ to 3 times in total length, length of head 2½ to 2¾ times. Snout ⅓ to ⅜ diameter of eye, which is 3 times in length of head and nearly twice interorbital width; maxillary extending to below centre or posterior third of eye, the width of its distal extremity ⅖ to ½ diameter of eye; three or four strong antrorse spines on lower border of præopercle; opercle with a strong spine. Gill-rakers very short, 7 (and some rudiments) on lower part of anterior arch. Dorsal originating on the nape; fourth and fifth or third to fifth spines longest, about ½ length of head, as long as or a little longer than longest soft rays; first and last spines only half as long. Pectoral ⅔ to ¾ length of head. Ventral nearly as long as pectoral, reaching anus or a little beyond. Second anal spine very long and strong, ⅔ to ¾ length of head. Caudal rounded. Pale brown or reddish, marbled with darker; fins spotted and striped with dark brown and black.

Total length 110 millim.

Indian and Western Pacific Oceans, from the Nicobars to North Australia.

| | | |
|---|---|---|
| *a.* Ad. | Singapore. | Dr. Cantor. |
| *b.* Ad., skin. | Singapore. | |
| *c.* Ad. | Cebu, Philippines. | Dr. A. B. Meyer [C.]. |
| *d.* Ad. | Torres Straits. | H.M.S. 'Alert.' |
| *e–f.* Hgr. & yg. | Mabuiag Id., Torres Straits. | Prof. Haddon [P.]. |
| *g.* Ad. | Port Essington. | J. Gould, Esq. [P.]. |



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| | | |
|---|---|---|
| *h.* Ad. | Port Essington. | Haslar Collection. |
| *i.* Ad., skin. | Port Essington. | |
| *k.* Yg. | Freycinet's Harbour. | H.M.S. 'Herald.' |
| *l.* Ad. | Port Molle, Queensland. | H.M.S. 'Alert.' |
| *m.* Ad. | Australia. | G. Krefft, Esq. [P.]. |
| *n.* Hgr. | Australia. | Sir J. Richardson [P.]. |
| *o.* Ad., skel. | Australia. | Haslar Collection. |
| *p.* Ad., skel. | ——? | |

## 15. POLYPRION.

Polyprion, *Cuv. Règne Anim.* ii. p. 282 (1817); *Cuv. & Val.* iii. p. 21 (1829); *Günth. Cat.* i. p. 168 (1859); *Bleek. Arch. Néerl.* xi. 1876, p. 253; *Jord. & Gilb. Syn. Fish. N. Am.* p. 532 (1882); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 341.
Hectoria, *Casteln. Notes Ed. Fish. Vict.* p. 8 (1873).

Body feebly compressed; scales very small, rough and ciliated. Lateral line complete, but partly concealed under the adjacent scales, the tube straight and occupying the whole length of the scale. Mouth large, protractile; maxillary exposed, with supplemental bone; jaws with broad bands of villiform teeth; teeth on vomer and palatines; a patch of teeth on the tongue; head scaly; præopercle serrated; opercle with a strong spine, and with a strong horizontal ridge. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers long. A single dorsal, with XI–XII 11–12 rays, the spinous portion much longer than the soft, which is scaly at the base. Anal short, with III 8–9 rays, scaly at the base. Caudal rounded or truncate. Pectorals asymmetrical, obtusely pointed, with 18 or 19 rays, upper longest. Ventrals below base of pectorals, with a strong spine. Posterior processes of præmaxillaries not extending to the frontals; parietal and supraoccipital bones not extending to between postfrontal processes; supraoccipital crest strong, but not produced forward on the cranium. Vertebræ 26–27 (13–14+13–14).

Atlantic and Pacific Oceans, mostly at great depths.

### 1. Polyprion americanus.

Amphiprion americanus, *Bl. Schn. Syst. Ichth.* p. 205 (1801).
Amphiprion australe, *Bl. Schn. l. c.* pl. xlvii.
Scorpæna massiliensis, *Risso, Ichth. Nice*, p. 184 (1810).
Polyprion cernium, *Val. Mém. Mus.* xi. 1824, p. 265, pl. xvii.; *Cuv. & Val.* iii. p. 21, pl. xlii. (1829), & viii. p. 475 (1831); *Yarr. Brit. Fish.* 2nd ed. i. p. 19, figs. (1841); *Düben & Koren, Vetensk. Ak. Handl. Copenh.* xlv. 1844, p. 29; *Nilss. Skand. Faun., Fisk.* p. 33 (1855); *Günth.* i. p. 169 (1859); *Lowe, Fish. Madeira*, p. 183 (1860); *Couch, Brit. Fish.* i. p. 200, pl. xliv. (1862); *Steind. Sitzb. Ak. Wien*, lvi. i. 1867, p. 617; *Canestr. Faun. Ital., Pesci*, p. 78 (1874); *Day, Fish. Gr. Brit.* p. 17, pl. vi. (1880); *Moreau, Poiss. France*, ii. p. 349, fig. (1881); *Lilljeb. Sver. Norg. Fisk.* p. 71 (1881); *Emery, Mitth. Zool. Stat. Neap.* vi. 1885, p. 155, pl. x. fig. 14; *Doderl. Man. Ittiol. Medit.* iv. p. 88 (1889); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 341.

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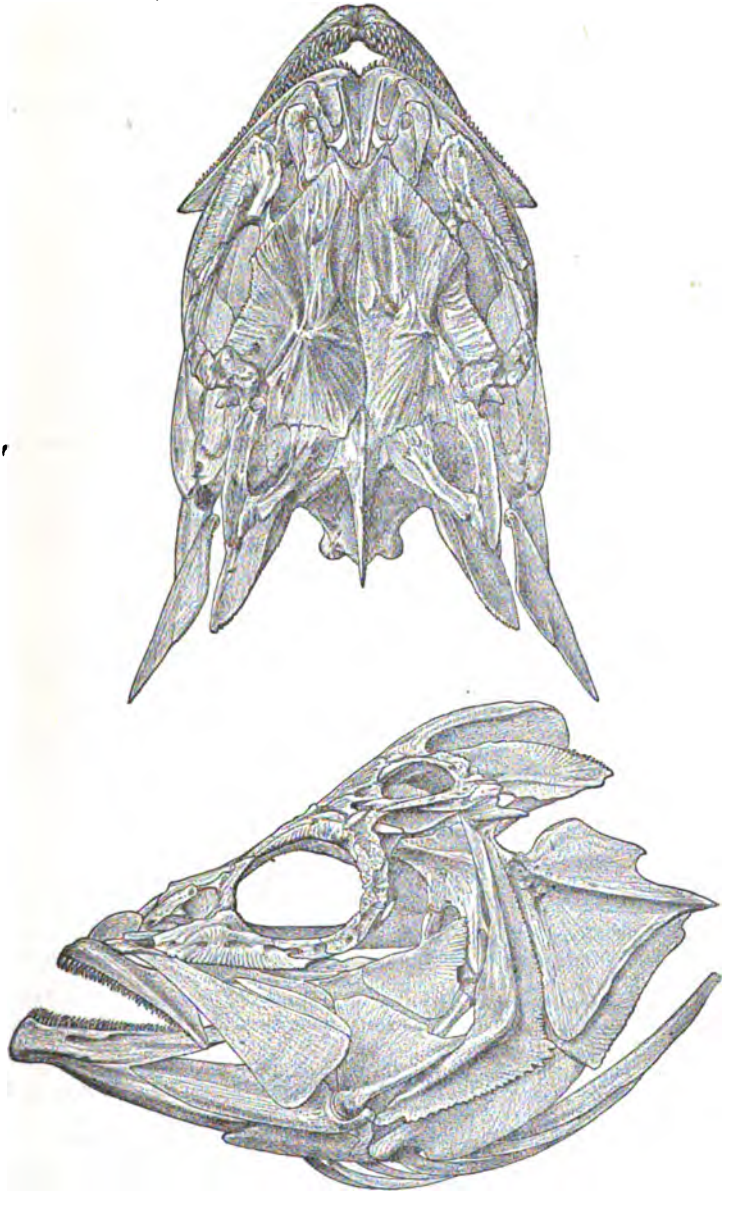

Fig. 12.—Upper and side views of skull of *Polyprion americanus*.

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Holocentrus gulo, *Risso, Eur. Mér.* iii. p. 367 (1826).
Serranus couchii, *Yarr. Brit. Fish.* i. p. 12, fig. (1836).
Polyprion americanum, *Costa, Faun. Nap., Pesci,* i. p. — (1850); *Smitt, Scand. Fish.* i. p. 47, fig. (1893).
Polyprion massiliense, *Costa, l. c.* pl. i.
Polyprion oxygenius, *Jord. & Gilb. Syn. Fish. N. Am.* p. 532 (1882).

D. XI–XII 11–12. A. III 9. Sc. 110–135 $\frac{15-17}{42-50}$; l. l. 82–90.

Depth of body equal to length of head, $2\frac{2}{3}$ to $3\frac{1}{2}$ times in total length. Head flat above, with serrated ridges in the young, which gradually lose their asperities in the adult; snout about $1\frac{1}{2}$ diameter of eye, which is 5 to $5\frac{1}{2}$ times in length of head; interorbital width 3 to $3\frac{1}{2}$ times in length of head; lower jaw strongly projecting; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{3}{4}$ to $\frac{4}{5}$ diameter of eye. Gill-rakers a little longer than gill-fringes, 7 or 8 (and some rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth to sixth or seventh spines longest, $2\frac{1}{2}$ to $3\frac{2}{3}$ times in length of head, shorter than longest soft rays; a more or less deep notch between spinous and soft portions. Pectoral $\frac{1}{2}$ length of head, a little shorter than ventral. Third anal spine longest. Spines striated and, in the young, studded with spinules. Caudal rounded in the young, truncate in the adult. Grey-brown above, young with lighter blotches.

Total length 720 millim.

Tropical and North Atlantic.

| | | |
|---|---|---|
| *a.* Hgr., stffd. | Plymouth. | W. Yarrell, Esq. [P.]. |
| *b, c.* Hgr., stffd. | Polperro. | J. Couch, Esq. [P.]. |
| *d.* Yg. | Mediterranean. | |
| *e.* Ad. | Madeira. | R. Blandy, Esq. [P.]. |
| *f.* Hgr. | Madeira. | J. Y. Johnson, Esq. [P.]. |
| *g.* Hgr. | Madeira. | Rev. R. T. Lowe [P.]. |
| *h.* Ad., skel. | Madeira. | R. Blandy, Esq. [P.]. |
| *i.* Hgr., skel. | Polperro. | |

## 2. Polyprion prognathus.

Epinephelus oxygeneios, *Bl. Schn. Syst. Ichth.* p. 301 (1801).
Perca prognatha, *Forster, in Bl. Schn. l. c., and Descr. Anim.* p. 309 (1844).
Polyprion cernium, *Richards. in Dieffenb. N. Zeal.* ii. p. 206 (1843); *Kner, Novara, Fische,* p. 28 (1865); *Sauv. Arch. Zool. Expér.* viii. 1880, p. 12.
Centropristis gigas, *Owen, Cat. Osteol. Coll. Surg.* i. p. 51 (1853).
Oligorus gigas, *Günth.* i. p. 251 (1859); *Hutton, Fish. N. Zeal.* p. 1 (1872); *Hector, op. cit.* p. 102, pl. i. fig. 1.
Oligorus gadoides, *Hutton, Tr. N. Zeal. Inst.* v. 1872, p. 259.
Hectoria gigas, *Casteln. Notes Ed. Fish. Vict.* p. 8 (1873).
Polyprion knerii, *Steind. Sitzb. Ak. Wien,* lxxi. i. 1875, p. 443; *Günth. Zool. Challeng., Shore Fish.* p. 24 (1880).
Polyprion prognathus, *Günth. Ann. & Mag. N. H.* (5) xx. 1887, p. 236; *Gill, Mem. Nat. Ac. Washingt.* vi. 1893, p. 96.

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Polyprion oxygeneios, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 342.

D. XI–XII 12–13. A. III 8. Sc. 140–180 $\frac{15-20}{40-45}$; l. l. 83–90.

Very closely allied to the preceding, but more elongate, the depth of the body 3½ to 4 times in the total length and the length of the head 2½ to 3 times; head more than twice length of pectoral. Longest dorsal spine 3⅓ to 5½ times in length of head.

Total length 1100 millim.

South Pacific and South Atlantic Oceans.

| | | | |
|---|---|---|---|
| *a.* | Ad. | Tasmania. | |
| *b.* | Ad., stffd. | Dunedin, N. Zealand. | Otago University. |
| *c.* | Hgr. | Otago, N. Zealand. | Otago University. |
| *d.* | Ad. | Juan Fernandez. | H.M.S. 'Challenger. |
| *e.* | Ad., stffd. | Juan Fernandez. | Gov. of Chili [P.]. |
| *f.* | Hgr., stffd. | Juan Fernandez. | E. C. Reed, Esq. [P.]. |

## 16. OLIGORUS.

Grystes, part., *Cuv. & Val.* iii. p. 54 (1829).
Oligorus, *Günth. Cat.* i. p. 251 (1859); *Bleek. Arch. Néerl.* xi. 1876, p. 262.
Homodemus, *De Vis, Proc. Linn. Soc. N. S. W.* ix. 1884, p. 395.

Body elongate, compressed; scales very small, finely ciliated. Lateral line complete; tubes straight and occupying the whole length of the exposed part of the scale. Head depressed; mouth large, protractile; maxillary exposed, with supplemental bone; teeth in broad villiform bands; teeth on vomer and palatines; tongue smooth; head partly naked; opercle ending in a spine. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers short. Dorsal single, with XI 14–16 rays, the spinous portion longer than the soft; anal short, with III 11–13 rays; soft dorsal and anal scaly at the base. Pectorals asymmetrical, rounded, with 20 rays, upper longest. Ventrals slightly in front of base of pectorals, close together, with a feeble spine. Caudal rounded. Posterior processes of præmaxillaries not extending to the frontals; a transverse ridge on the frontals posteriorly, connecting the parietal crests, which are feeble; supraoccipital crest feeble, not extending on the frontals. Vertebræ 35 (16+19).

Rivers of Australia.

### 1. Oligorus macquariensis.

Grystes macquariensis, *Cuv. & Val.* iii. p. 58 (1829); *Richards. Zool. Ereb. & Terr., Fish.* p. 118, pl. liii. figs. 8 & 9 (1848); *Guér. Icon. R. An., Poiss.* pl. v. fig. 2 (1844).
Grystes brisbanii, *Lesson, Voy. Coquille, Zool.* ii. p. 227 (1831).
Gristes peelii, *Mitchell, Exped. E. Austral.* p. 95, pl. v. fig. 1 (1838).
Oligorus macquariensis, *Günth.* i. p. 251 (1859); *Tenison-Woods, Fish. N. S. W.* p. 102, pl. xli. (1882).

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Oligorus mitchellii, *Casteln. Proc. Zool. Soc. Vict.* ii. 1873, p. 150; *Douglas-Ogilby, Cat. Fish. N. S. W.* p. 9 (1887).

? Oligorus gibbiceps, *Macleay, Proc. Linn. Soc. N. S. W.* x. 1885, p. 267.

Homodemus cavifrons, *De Vis, Proc. Linn. Soc. N. S. W.* ix. 1884, p. 396.

D. XI 14–16. A. III 11–13. Sc. 110–120 $\frac{16-20}{47-55}$; l. l. 70–75.

Depth of body $3\frac{1}{2}$ to $3\frac{3}{4}$ times in total length, length of head 3 to $3\frac{1}{2}$ times. Snout $1\frac{1}{2}$ to 2 times as long as diameter of eye, which is contained $5\frac{1}{2}$ to 9 times in length of head; interorbital width $3\frac{1}{2}$ to $4\frac{1}{2}$ times in length of head; maxillary extending to below posterior border of eye or beyond in the adult, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{4}$ diameter of eye; cheeks and opercles covered with very small cycloid scales. Gill-rakers rounded or club-shaped, 12 to 14 on lower part of anterior arch. Dorsal originating above base of pectoral; fifth or fourth and fifth spines longest, $\frac{1}{4}$ to $\frac{1}{3}$ length of head, shorter than longest soft rays; last spine as long as second or third. Pectoral $\frac{1}{2}$ length of head. Ventral as long as or a little longer than pectoral, outer soft ray somewhat produced, not reaching anus. Second and third anal spines equal, as long as eleventh dorsal. Caudal rounded. Greyish or olive, spotted or dotted with darker.

Total length 860 millim.

Queensland, New South Wales, Victoria.

| | | |
|---|---|---|
| *a.* Hgr. | River Mary, Queensland. | H.M.S. 'Challenger.' |
| *b.* Hgr. | Port Jackson. | Imperial Instit. [P.]. |
| *c.* Ad. | Richmond River. | Imperial Instit. [P.]. |
| *d.* Ad., stffd. | Wagga Wagga, New South Wales. | Australian Mus. |
| *e.* Ad., stffd. | New South Wales. | Australian Mus. |
| *f.* Hgr. | Murray River. | |
| *g, h.* Ad., stffd. | Australia. | Lord Derby [P.]. |
| *i.* Hgr., skel. | River Mary. | H.M.S. 'Challenger.' |

## 17. STEREOLEPIS.

Stereolepis, *Ayres, Proc. Calif. Ac.* ii. 1859, p. 28; *Gill, Proc. Ac. Philad.* 1863, p. 329; *Bleek. Arch. Néerl.* xi. 1876, p. 262; *Jord. & Gilb. Syn. Fish. N. Am.* p. 531 (1882); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 343.

Megaperca, *Hilgendorf, Sitzb. Ges. nat. Fr. Berl.* 1878, p. 155.

Body compressed; scales very small, ciliated. Lateral line complete. Mouth rather large, protractile; maxillary exposed, with supplemental bone; villiform teeth in jaws and on vomer and palatines; tongue smooth; head scaly; præopercle serrated, with a few strong antrorse spines on the lower border, disappearing in old specimens; opercle with two obtuse spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present. Dorsal fins confluent, but with a deep notch between the spinous and soft portions, with XI 10 rays, the spinous portion much longer than the

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soft; anal short, with III 8 rays; soft dorsal and anal covered with scales. Caudal truncate or rounded. Pectorals asymmetrical, obtusely pointed, rays 18–19, upper longest. Ventrals slightly in front of the pectorals, close together, with a strong spine. Vertebræ 26 (12+14).

Coasts of Japan and California.

### 1. Stereolepis gigas.

Stereolepis gigas, *Ayres, Proc. Calif. Ac.* ii. 1859, pp. 28 & 54, fig. 6; *Jord. & Gilb. Syn. Fish. N. Am.* p. 531 (1882); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 344.
Stereolepis californicus, *Gill, Proc. Ac. Philad.* 1863, p. 330.
Megaperca ischinagi, *Hilgend. Sitzb. Ges. nat. Fr. Berl.* 1878, p. 156; *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 228, pl. iii. fig. 3.

D. XI 10. A. III 8. Sc. 80–100 $\frac{15}{35}$; l. l. 60.

Greatest depth of body about $\frac{1}{3}$ total length, and nearly equal to length of head. Eye very small in full-grown specimens. Lower jaw slightly projecting; maxillary extending to below anterior border or centre of eye; snout and jaws naked; præorbital not serrated; opercular spines feeble. Dorsal originating above base of pectoral; spines strong, proportionally shorter in the adult than in the young, fourth to sixth longest; soft dorsal about half length of spinous. Anal spines strong, first shortest, second and third equal and about as long as the second dorsal spine. Caudal rounded in the young, truncate in the adult. Adult uniform blackish; young whitish with five broad black stripes, or brownish with large black blotches.

Grows to over 2 metres (7 feet).

Japan and California.

## 18. DINOPERCA.

Body compressed; scales very small, ciliated. Lateral line complete. Mouth rather large, protractile; maxillary exposed, with supplemental bone (?); broad bands of villiform teeth in jaws, with an outer row of feebly enlarged, conical, but somewhat obtuse teeth; vomer and palatines toothed; tongue smooth; head scaly; præopercle serrated; opercle with short, obtuse spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present. Dorsal fins confluent, but rather deeply notched, with XI 19 rays, the spinous and soft portions equal in length; anal short, with III 13 rays; soft dorsal and anal covered with scales. Caudal truncate or slightly emarginate. Pectorals asymmetrical, obtusely pointed, with 19 rays, upper longest. Ventrals a little in front of pectorals, close together, with a strong spine.

Coasts of Baluchistan and Sind.

The fish, for which I feel compelled to propose a new genus, is only known to me from the figure and short description given by Day. But it is quite certain that it is by no means related to

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*Hapalogenys*, to which it was referred with some hesitation by its describer; its affinities appear to be with *Stereolepis*, from which it is distinguished by the longer soft dorsal.

### 1. Dinoperca petersii.

Hapalogenys petersi, *Day, Fish. Ind.* p. 77, pl. xx. fig. 3 (1875), *and Faun. Ind., Fish.* i. p. 513, fig. (1889).

D. XI 19. A. III 13. Sc. circa 100.

Depth of body $2\frac{3}{4}$ times in total length, length of head 3 times. Snout as long as diameter of eye, which is $3\frac{1}{2}$ times in length of head; interorbital width $4\frac{1}{2}$ times in length of head; lower jaw projecting; maxillary extending to below centre of eye, the width of its distal extremity $\frac{3}{5}$ diameter of eye; serræ of præopercle slightly enlarged at the angle; opercular spines short, obtuse; anterior and under surface of mandible and lips covered with fine barbel-like papillæ. Dorsal originating above axilla; third to fifth and eleventh spines longest, $\frac{1}{4}$ length of head, hardly $\frac{1}{2}$ length of longest (anterior) soft rays. Pectoral $\frac{2}{3}$ length of head, longer than ventral. Anal spines graduated, third nearly as long as longest dorsal; soft portion deepest anteriorly. Caudal truncate or slightly emarginate. Blackish grey, with the fins darker.

The type specimen (in the Calcutta Museum) measures 18 inches; the species grows to a much larger size.

Coasts of Baluchistan and Sind.

## 19. LIOPROPOMA.

Liopropoma, *Gill, Proc. Ac. Philad.* 1861, p. 52; *Poey, Ann. Lyc. N. H. N. Y.* x. 1874, p. 73.
Pikea, *Steindachn. Sitzb. Ak. Wien*, lxxi. 1874, p. 375; *Bleek. Arch. Néerl.* xi. 1876, p. 262.
Liopropoma, part., *Bleek. l. c.*
Labracopsis, *Steindachn. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 255.

Body elongate, compressed; scales small, striated and finely ciliated. Lateral line complete, extending on the base of the caudal, the tube with an ascending tubule. Mouth large, protractile; maxillary exposed, with well-developed supplemental bone; jaws with broad bands of villiform teeth, the inner longest and depressible; vomer and palatines toothed; tongue smooth; head entirely covered with cycloid scales; præopercle entire, ciliated, or finely serrated; opercle with one or three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present. Dorsal single, with VIII–IX 12–14 rays, the spinous and soft portions nearly equally long, scaly at the base; anal short, with III 8–10 rays, scaly at the base. Pectorals asymmetrical, pointed, with 14 or 15 rays, upper longest. Ventrals slightly in front of base of pectorals,

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close together, with a strong spine. Caudal emarginate, scaly. Vertebræ 24 (10+14).

Coasts of Cuba, Japan, and the Mascarene Islands.

*Synopsis of the Species.*

I. Last dorsal spine not half as long as longest soft rays; præopercular border entire or very finely ciliated.

Dorsal spines nine, third and fourth longest; l. l. 45 ..... 1. *aberrans*, p. 155.

Dorsal spines eight, second and third longest, eighth longer than fourth; l. l. 47 ..... 2. *lunulatum*, p. 155.

Dorsal spines eight, third longest, fourth longer than eighth; l. l. 70 ..... 3. *maculatum*, p. 156.

II. Last dorsal spine half as long as longest soft rays; præopercular border denticulated; l. l. 47 ..... 4. *japonicum*, p. 156.

### 1. Liopropoma aberrans.

Perca aberrans, *Poey, Mem. Cuba*, ii. p. 125, pl. xii. figs. 2 & 3 (1860).

Liopropoma aberrans, *Gill, Proc. Ac. Philad.* 1861, p. 52.

D. IX 12. A III 8. Sc. 45.

Depth of body 4 times in total length, length of head 3 times. Snout a little longer than diameter of eye, which is $4\frac{1}{2}$ times in length of head; lower jaw projecting; maxillary extending to below centre of eye, the width of its distal extremity about $\frac{2}{3}$ diameter of eye; præopercular border rounded, entire; opercle with a strong spine. Dorsal originating just behind vertical of axilla; first spine short, third longest, nearly $\frac{1}{3}$ length of head and a little longer than second and fourth, sixth and seventh short, the last two again increasing in length; soft rays increasing in length from front to back, the longest about $\frac{1}{2}$ length of head. Pectoral nearly $\frac{3}{4}$ length of head. Ventral shorter. Third anal spine longest, $\frac{1}{2}$ as long as longest soft rays. Caudal emarginate. Lateral line forming a strong curve below the dorsal. Head pink, with orange spots; body and vertical fins orange; pectorals and ventrals pink.

Total length 115 millim.

Coast of Cuba.

### 2. Liopropoma lunulatum.

Grystes lunulatus, *Guichen. in Maillard, Réunion*, App. C. p. 4 * (1863).

Pikea lunulata, *Steind. Sitzb. Ak. Wien*, lxx. i. 1874, p. 375, *and Denkschr. Ak. Wien*, xlvii. 1883, pl. vi. fig. 2; *Sauv. Hist. Madag., Poiss.* p. 375, pl. xxii. fig. 1 (1891).

D. VIII 12. A. III 8. Sc. 47 $\frac{5}{25}$.

Depth of body $3\frac{1}{3}$ times in total length, length of head 3 times.

* Type (Paris Museum, no. 1318) examined. The specimen has been stuffed and is in bad condition.

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Snout slightly longer than diameter of eye, which is 4½ times in length of head and a little exceeds interorbital width; lower jaw projecting; maxillary extending to below centre of eye, the width of its distal extremity about ⅔ diameter of eye; præopercular border rounded, very finely ciliated; opercle with three flat points. Dorsal originating just behind vertical of axilla; first spine short; second and third longest, about ⅓ length of head; fifth and sixth short, about ½ length of second; fourth and eighth equal in length and about ¾ length of second; soft rays increasing in length to the eighth, which is nearly ⅔ length of head. Pectoral ⅖ length of head. Ventral shorter. Third anal spine longest, as long as longest dorsal and ½ longest soft rays. Caudal emarginate, the lobes rounded. Lateral line forming a strong curve below the dorsal. Yellowish, with numerous small crescentic dark brown spots on the body, and dots on the head and on the dorsal and caudal fins.

Total length 170 millim.

Coasts of the Mascarene Islands (Mauritius, Bourbon, and Reunion).

### 3. Liopropoma maculatum.

Pikea maculata, *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 234, pl. vi. fig. 1.

D. VIII 12. A. III 8. Sc. 70 $\frac{6}{30}$.

Depth of body 4 times in total length, length of head 3 times. Snout longer than diameter of eye, which is 5 times in length of head and nearly equals interorbital width; lower jaw projecting; maxillary extending a little beyond vertical of centre of eye, the width of its distal extremity ⅔ diameter of eye; præopercular border rounded, very finely ciliated; opercle with three flat points. Dorsal originating just behind vertical of axilla; first spine short; third longest, nearly ⅓ length of head; the remainder gradually decreasing in length, the last about ⅓ length of longest; soft rays increasing in length to the ninth, which is about ½ length of head. Pectoral ¾ length of head. Ventral shorter. Second and third anal spines equal, as long as second dorsal, ½ longest soft rays. Caudal emarginate, the lobes rounded. Lateral line feebly curved. Reddish yellow, above with roundish brown spots.

Total length 250 millim.

Coast of Japan (Tokio).

### 4. Liopropoma japonicum.

Pikea (Labracopsis) japonica, *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 235, pl. vi. fig. 3.

D. VIII 14. A. III 10. Sc. 47 $\frac{4}{22}$.

Depth of body 3¾ times in total length, length of head 3 times. Snout as long as diameter of eye, which is 4 times in length of head

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and exceeds interorbital width; lower jaw projecting; maxillary nearly reaching to below posterior border of eye, the width of its distal extremity about $\frac{1}{2}$ diameter of eye; præopercular border rounded, finely denticulate; opercle with three flat points. Dorsal originating above axilla; first spine short, third longest, $\frac{1}{3}$ length of head and $\frac{2}{3}$ length of longest soft rays, the others subequal and about $\frac{1}{2}$ length of longest soft rays. Pectoral $\frac{3}{4}$ length of head. Ventral shorter. Third anal spine a little longer than second, as long as second dorsal, $\frac{3}{5}$ length of longest soft rays. Caudal feebly emarginate. Lateral line strongly curved under the dorsal. Reddish golden, with a dark lateral stripe from the eye to the base of the caudal; upper and lower borders of caudal fin whitish.

Total length 180 millim.

Coast of Japan (Tokio).*

## 20. AULACOCEPHALUS.

Aulacocephalus, *Temm. & Schleg. Faun. Japon., Pisc.* p. 15 (1844); *Günth. Cat.* i. p. 173 (1859); *Bleek. Arch. Néerl.* xi. 1876, p. 254.

Body very strongly compressed. Scales very small, strongly ciliated, separated from one another by the naked skin. Lateral line complete, the tubes long and straight, on the naked skin, terminating on the scale. Head scaled only on the sides, above and on the sides of the snout with the skin adherent to rugosities of the bones; mouth large, protractile; maxillary exposed, with supplemental bone; bands of villiform teeth in jaws and on vomer and palatines; tongue smooth; præopercle serrated; opercle with three strong spines; gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers long. Dorsal fins confluent, with IX 12 rays, the spinous portion longer than the soft. Anal short, with III 9 rays. Caudal truncate. Pectorals subsymmetrical, rounded, with 15 rays. Ventrals below pectorals, close

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* Bleeker has described, from a collection of Chinese drawings, two fishes which he places with doubt in *Paralabrax*. But as they are stated to have 8 dorsal spines, they cannot well be referred to that subgenus of *Serranus*, in which the number of dorsal spines is invariably 10. It is possible that they belong to the present genus. The following are Bleeker's diagnoses:—

PARALABRAX ? FASCIATUS, Bleek. Nederl. Tijdschr. Dierk. iv. 1873, p. 150.

"Corpus altitudine 3¾ circ. in ejus longitudine, purpurascens. Fasciæ latæ transversæ nigricantes 4, fascia 1ª nucho-axillaris, 2ª dorso-lateralis, 3ª dorso-analis, 4ª caudalis. Vitta oculo-opercularis vel temporalis profunda nulla. D. 8/16 ? Squamæ 50 ? in linea laterali."

PARALABRAX ? GUTTATUS, Bleek. l. c.

"Corpus altitudine 3¾ circ. in ejus longitudine, purpurascens. Squamæ dorso lateribusque singulæ guttala aureo-rubra. Vitta subocularis longitudinalis flava. Opercula striis longitudinalibus rubris. Pinnæ immaculatæ, dorsalis radiosa, ventrales, analis caudalisque dimidio libero nigricantes. D. 8/14 ? Squamæ 30 ? in linea laterali."

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together, with a strong spine. Præmaxillary processes not extending to frontals; parietals and supraoccipital short, latter with a feeble crest not extending on the cranium. Vertebræ 24 (10+14).

Pacific and Indian Oceans.

### 1. Aulacocephalus temminckii.

Aulacocephalus, *Temm. & Schleg. Faun. Japon., Pisc.* p. 15, pl. v. fig. 2 (1844).

Aulacocephalus temminckii, *Bleek. Verh. Batav. Gen.* xxvi. 1857, *Ichth. Jap.* p. 12.

Aulacocephalus schlegelii, *Günth.* i. p. 173 (1859); *Steind. Sitzb. Ak. Wien*, lxx. i. 1875, p. 378; *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 233.

Centropristis saponaceus, *Val. C. R. Ac. Sc.* liv. 1862, p. 1167.

D. IX 12. A. III 9. L. l. 73.

Depth of body 3 times in total length, length of head $2\frac{1}{2}$ to $2\frac{2}{3}$ times. Snout $1\frac{2}{3}$ to $2\frac{1}{2}$ times diameter of eye, which is 5 to 7 times in length of head and equals or a little exceeds interorbital width; lower jaw projecting; maxillary extending to below centre of eye, the width of its distal extremity equal to or a little less than diameter of eye. Gill-rakers longer than gill-fringes, 17 or 18 on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth spines longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, as long as or a little shorter than longest soft rays; a deep notch between the spinous and soft portions of the fin. Pectoral about $\frac{2}{5}$ length of head. Second and third anal spines equal, hardly half as long as longest soft rays. Caudal truncate. Lateral line strongly curved, approaching the spinous dorsal, forming an angle below the last dorsal rays. Purple, with a yellowish, black-edged dorsal stripe; this stripe bifurcating under the anterior dorsal spines, each branch extending to the end of the snout after passing through the eye.

Total length 300 millim.

Sea off Japan, Siam, and Mauritius.

| | | |
|---|---|---|
| *a.* Ad. | Mauritius. | M. V. de Robillard [C.]. |
| *b, c.* Ad. & hgr., stffd. | Mauritius. | |
| *d.* Hgr., skel. | Siam. | |

### 21. GONIOPLECTRUS.

Plectropoma, part., *Cuv. & Val.* ii. p. 387 (1828); *Günth. Cat.* i. p. 156 (1859); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 94 (1877).

Gonioplectrus, *Gill, Proc. Ac. Philad.* 1862, p. 236; *Poey, Ann. Lyc. N. H. N. Y.* x. 1874, p. 57; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 345.

Hypoplectrus, part., *Bleek. Arch. Néerl.* xi. 1876, p. 255.

Body compressed; scales small, ciliated. Lateral line complete. Mouth large, protractile; maxillary exposed, with supplemental bone; teeth in jaws in several series, the inner movable, depressible,

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hinged at the base; canine teeth present; teeth on vomer and palatines; tongue smooth; head partly scaled; præopercle serrated, with a strong antrorse spine below; opercle with three or four spines, one of which is very large. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present. Gill-rakers elongate. A single dorsal, with VIII 12–13 rays, the spinous portion longer than the soft. Anal with III 7 rays. Caudal rounded. Pectorals asymmetrical, rounded, with 17 rays, upper longest. Ventrals below the pectorals, close together, with a strong spine. Supraoccipital and parietal bones not extending forwards to between postfrontal processes; supraoccipital crest short; top of cranium convex, without crests. Vertebræ 24 (10+14).

Coasts of the West Indies.

### 1. Gonioplectrus hispanus.

Plectropoma hispanum, *Cuv. & Val.* ii. p. 396 (1828); *Poey, Mem. Cuba*, i. p. 72, pl. iv. fig. 1 (1851); *Günth.* i. p. 165 (1859).
Gonioplectrus hispanus, *Poey, Repert. Cuba*, ii. 1868, p. 289; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 346.

D. VIII 12–13. A. III 7. Sc. 65–70 $\frac{10}{40}$.

Depth of body $2\frac{2}{3}$ to $2\frac{3}{4}$ times in total length, length of head $2\frac{1}{2}$ times. Snout a little longer than diameter of eye, which is $4\frac{1}{2}$ to 5 times in length of head; interorbital space narrow; lower jaw projecting; maxillary extending to below centre of eye, the width of distal extremity $\frac{2}{3}$ diameter of eye; præopercle finely serrated, with a single very large antrorse hook at the angle; opercle with three or four spines, the second of which is long, straight, and knife-shaped; cheeks and opercles scaled. Gill-rakers rather long and slender, 15 on lower part of anterior arch. Dorsal originating above axilla; spines increasing in length to the third, which is $\frac{1}{3}$ length of head and a little shorter than longest soft rays. Pectoral $\frac{2}{3}$ length of head, longer than ventral. Second anal spine longest, nearly $\frac{1}{2}$ length of head, slightly shorter than longest soft rays. Caudal rounded. Lateral line strongly curved below the spinous dorsal. Head and body and dorsal fin striped red and yellow; a whitish cross-bar in front of anus.

Total length 200 millim.

Coasts of the West Indies.

## 22. PLECTROPOMA.

Plectropoma, part., *Cuv. Règne Anim.* ii. p. 277 (1817); *Cuv. & Val.* ii. p. 387 (1828); *Günth. Cat.* i. p. 156 (1859); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 94 (1877).
Plectropoma, *Gill, Proc. Ac. Philad.* 1862, p. 236.
Paracanthistius, *Bleek. Verh. Ak. Amst.* xiv. no. 2, 1873, p. 13, *Atl. Ichth.* vii. p. 25 (1876), *and Arch. Néerl.* xi. 1876, p. 256.

Body elongate, compressed; scales very small, roughish but not ciliated. Lateral line feebly marked, the tubes very short and straight,

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the scales ciliated. Mouth large, protractile; maxillary exposed, with supplemental bone; teeth in jaws in several series, the inner movable, depressible, hinged at the base; very strong canine teeth in front of both jaws and on the side of the mandible; teeth on vomer and palatines; tongue smooth. Head partly scaled, snout naked; præopercle entire or finely serrate behind, with antrorse spines on the lower border; opercle with three spines. Gill-membranes separate; pseudobranchiæ present; gill-rakers moderate. Dorsal fin single, with VI–VIII 11–12 rays, the spinous portion nearly as long as the soft. Anal short, with III 8 rays, the spines very feeble, flexible. Caudal truncate or emarginate. Pectorals symmetrical, rounded, with 16 to 18 rays. Ventrals below the pectorals, close together, with a feeble, flexible spine. Posterior processes of præmaxillaries extending nearly to between the frontals; parietal and supraoccipital bones extending to between postfrontal processes, with short, feeble crests. Vertebræ 24 (10+14).

Indian and Western Pacific Oceans.

### 1. Plectropoma maculatum.

Bodianus maculatus, *Bloch, Ausl. Fische*, iv. p. 48, pl. ccxxviii. (1790); *Lacép. Poiss.* iv. pp. 280 & 293 (1802).
Labrus lævis, *Lacép. op. cit.* iii. pp. 431 & 477, pl. xxiii. fig. 2.
Bodianus cyclostomus, *Lacép. op. cit.* iii. pl. xx., and iv. pp. 282 & 293.
Bodianus melanoleucus, *Lacép. op. cit.* iv. pp. 283 & 296.
Holocentrus leopardus, *Lacép. t. c.* pp. 332 & 367.
Plectropoma punctatum, *Quoy & Gaim. in Freycinet, Voy. Uranie et Physic., Zool.* p. 318, pl. xlv. fig. 1 (1824).
Plectropoma melanoleucum, *Cuv. & Val.* ii. p. 388 (1828); *Günth.* i. p. 157 (1859).
Plectropoma leopardinum, *Cuv. & Val. t. c.* p. 392, pl. xxxvi.; *Temm. & Schleg. Faun. Japon., Pisc.* p. 12 (1844); *Bleek. Nat. Tijdschr. Nederl. Ind.* vii. 1854, p. 420; *Günth. t. c.* p. 157.
Plectropoma maculatum, *Cuv. & Val. t. c.* p. 393; *Rüpp. Atl. Fische Roth. Meer.* p. 110 (1828); *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 39; *Günth. t. c.* p. 156; *Playf. & Günth. Fish. Zanz.* p. 12 (1866); *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 21; *Günth. Fische Südsee*, p. 10, pl. x. (1873); *Klunz. Fische Roth. Meer.* p. 8 (1884).
Plectropoma areolatum, *Rüpp. op. cit.*, App. p. 2.
Plectropoma cyanostigma, *Bleek. Nat. Gen. Arch. Nederl. Ind.* ii. 1845, p. 525.
Plectropoma leopardus, *Richards. Rep. Ichth. China*, p. 230 (1846).
Paracanthistius leopardinus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 14, *and Atl. Ichth.* vii. p. 25, pl. ccxcvi. fig. 3 (1876).
Paracanthistius maculatus, *Bleek. ll. cc.* pp. 16, 26, pl. ccxci. fig. 3.

D. VII–VIII 11–12. A. III 8. Sc. 120–145 $\frac{16-20}{60-80}$; l. l. 80–106.

Depth of body equal to or a little less than length of head, 3¼ to 4 times in total length. Snout 1½ (young) to 3 times (adult) diameter of eye, which is 5 to 7½ times in length of head; interorbital width 4½ to 6½ times in length of head; lower jaw projecting; maxillary extending to below centre or posterior border of eye,

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the width of its distal extremity at least $\frac{2}{3}$ diameter of eye; præopercle rounded, with three or four strong antrorse spines on its lower border (less distinct in old specimens); opercle with three spines, median nearer lower than upper; cheeks and opercles covered with small scales; maxillary naked or with a few scales. Gill-rakers moderately long, 9 or 10 (and some rudiments) on lower part of anterior arch. Dorsal originating above axilla; spines rather slender, increasing in length to the third or fourth, which is nearly $\frac{1}{3}$ length of head and shorter than longest (anterior) soft rays. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head, as long as or slightly longer than ventrals. First anal spine rudimentary, often indistinct, third longest, bound to first soft ray. Caudal truncate or feebly emarginate, sometimes slightly produced at the angles. Coloration very variable: several varieties are distinguished, which, however, completely pass into one another.

Total length 1060 millim.

Indian and Western Pacific Oceans.

A. Yellowish-brown, with pale blue dark-edged spots, some of which are elongate and streak-like; young with a black blotch between the four or five anterior dorsal spines. (*P. maculatum.*)

| | | |
|---|---|---|
| *a, b.* Yg., skins. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *c, d.* Hgr., skins. | Singapore. | |
| *e.* Hgr. | Cape York. | |
| *f.* Hgr., stffd. | Samoa. | Rev. S. J. Whitmee [P.]. |

B. Brownish or red, with very numerous blue black-edged dots. (*P. leopardus.*)

| | | |
|---|---|---|
| *a.* Hgr., stffd. | Red Sea. | |
| *b, c.* Yg., skins. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *d, e, f.* Ad., stffd. | Mauritius. | M. V. de Robillard [C.]. |
| *g.* Hgr., stffd. | Louisiade Archipelago. | Capt. Stanley [P.]. |
| *h.* Ad., stffd. | Samoa. | Rev. S. J. Whitmee [P.]. |
| *i.* Ad. | Levuka, Fiji. | H.M.S. 'Challenger.' |
| *k.* Hgr., skeleton. | Pelew Ids. | Museum Godeffroy. |

C. Pale brownish or violet grey, posterior part of tail and lower lip yellowish; body with five dark brown or black cross-bands, the first between the eyes, the second across the nape, the third from the five anterior dorsal spines; the three bands on the body narrowing to a point below; fins bright yellow, pectoral and ventral with a black blotch at the base; more or less distinct small blue spots may be present. (*P. melanoleucum.*)

| | | |
|---|---|---|
| *a, b.* Hgr. & yg., skins. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *c.* Ad., stffd. | Mauritius. | M. V. de Robillard [C.]. |
| *d.* Hgr., skin. | Ceylon. | H. Nevill, Esq. [P.]. |
| *e.* Yg. | Pelew Ids. | Museum Godeffroy. |



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D. Brown, covered with small blue black-edged spots, and with traces of the dark cross-bands characteristic of var. C. Pectoral blackish, edged with yellowish.

*a*. Hgr., skin. Zanzibar. Sir Lambert Playfair [C.].

E. Brownish, clouded with lighter on the back; no spots or bands.

*a*. Hgr., skin. Seychelles. Sir Lambert Playfair [C.].

### 2. Plectropoma oligacanthus.

Plectropoma oligacanthus, *Bleek. Nat. Tijdschr. Nederl. Ind.* vii. 1854, p. 422; *Günth.* i. p. 157 (1859).
Acanthistius oligacanthus, *Bleek. Nederl. Tijdschr. Dierk.* ii. 1865, p. 277.
Paracanthistius oligacanthus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1874, p. 19, *and Atl. Ichth.* vii. p. 27, pl. cclxxix. fig. 2 (1876).

D. VI–VII 11–12.

Very closely allied to the preceding species, and only to be distinguished by the shape of the soft dorsal and anal fins, the border of which is concavely emarginate and the anterior rays very long, at least half length of head. Red; head and fins with blue longitudinal lines; body with small round blue spots and vertical blue lines down the flanks; pectoral bordered with yellow.

Total length 300 millim.

Malay Archipelago, Caroline Islands.

*a*. Hgr. Malay Archipelago. Bleeker Collection.
*b*. Hgr. Caroline Ids. Museum Godeffroy.

## 23. EPINEPHELUS.

Bodianus, part., *Bloch, Ausl. Fische*, iv. p. 33 (1790).
Holocentrus, part., *Bloch, t. c.* p. 59.
Epinephelus, *Bloch, op. cit.* vii. p. 11 (1793); *Gill, Proc. Ac. Philad.* 1862, p. 237; *Poey, Ann. Lyc. N. Y.* x. 1871, p. 38; *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 28, *and Atl. Ichth.* vii. p. 30 (1876); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 67 (1877): *Jord. & Gilb. Syn. Fish. N. Am.* p. 539 (1882); *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 379; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 350.
Alphestes, *Bloch Schn. Syst. Ichth.* p. 236 (1801); *Jord. & Swain, l. c.* p. 394; *Jord. & Eigenm. l. c.* p. 349.
Cephalopholis, *Bloch Schn. l. c.* p. 311.
Serranus, part., *Cuv. Règne An.* ii. p. 276 (1817), and 2nd ed. p. 138 (1829); *Cuv. & Val.* ii. p. 210 (1828); *Günth. Cat.* i. p. 97 (1859); *Vaill. & Boc. l. c.* p. 44.
Bodianus, *Cuv. Règne An.* ii. p. 276; *Gill, Proc. Ac. Philad.* 1862, p. 237; *Jord. & Eigenm. l. c.* p. 376.
Plectropoma, part., *Cuv. & Val. t. c.* p. 387; *Günth. t. c.* p. 156; *Vaill. & Boc. l. c.* p. 94.
Cromileptes, part., *Swains. N. H. Fish.* ii. p. 201 (1839); *Bleek. ll. cc.* pp. 25, 29.

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Cynichthys, *Swains. l. c.*
Variola, *Swains. l. c.* p. 202; *Bleek. ll. cc.* pp. 8, 23.
Uriphaeton, *Swains. l. c.*; *Bleek. l. c.* 1873, p. 3.
Cerna, *Bonap. Icon. Faun. Ital.* iii. *Introd.* (1841); *Doderl. Giorn. Sc. Palermo*, xv. 1882, p. 168.
Dermatolepis, *Gill, Proc. Ac. Philad.* 1861, p. 54, and 1862, p. 250; *Jord. & Swain. l. c.* p. 405; *Jord. & Eigenm. l. c.* p. 374.
Hyporthodus, *Gill, Proc. Ac. Philad.* 1861, p. 98.
Schistorus, *Gill, Proc. Ac. Philad.* 1862, p. 237; *Poey, Ann. Lyc. N. Y.* x. 1871, p. 43.
Prospinus, *Gill, l. c.*
Lioperca, *Gill, l. c.*; *Poey, l. c.* p. 40.
Mycteroperca, *Gill, Proc. Ac. Philad.* 1863, p. 80; *Jord. & Swain, l. c.* p. 360; *Jord. & Eigenm. l. c.* p. 364.
Labroperca, *Gill, l. c.*
Trisotropis, *Gill, Proc. Ac. Philad.* 1865, p. 104; *Poey, Ann. Lyc. N. Y.* ix. 1870, p. 302, and 1871, p. 35; *Jord. & Gilb. l. c.* p. 537.
Enneacentrus, *Gill, l. c.* p. 105; *Poey, l. c.* 1871, p. 50; *Jord. & Swain, l. c.* p. 397.
Petrometopon, *Gill, l. c.*; *Poey, l. c.* p. 48.
Priacanthichthys, *Day, Proc. Zool. Soc.* 1868, p. 193.
Promicrops, *Poey, Repert. Cuba*, ii. 1868, p. 287, *and l. c.* p. 42; *Jord. & Gilb. l. c.* p. 541; *Jord. & Swain, l. c.* p. 376; *Jord. & Eigenm. l. c.* p. 363.
Menephorus, *Poey, l. c.* 1871, p. 50.
Pseudoserranus, part., *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 687, *and Fische Roth. Meer.* i. p. 6 (1884).
Parepinephelus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 3.
Homalogrystes, *Alleyne & Macleay, Proc. Linn. Soc. N. S. W.* i. 1876, p. 268.
Itaiara, *Vaill. & Boc. l. c.* p. 70.
Hyposerranus, *Klunz. Fische Roth. Meer.* p. 3.
Garrupa, *Jord. & Eigenm. l. c.* p. 353.

Body more or less compressed; scales small, cycloid or denticulated. Lateral line complete, the tube with ascending tubule, rarely branching. Mouth large, protractile; maxillary exposed, with supplemental bone; teeth in jaws in several series, the inner movable, depressible, hinged at the base; canine teeth usually more or less developed; teeth on vomer and palatines; tongue smooth; head entirely or greater part scaled; præopercle usually serrated; opercle with one, two, or three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers more or less elongate, in some species very short, in others very long. Dorsal fins confluent, with IX–XI (rarely XII) 12–21 rays, the spinous portion as long as or longer than the soft. Anal short, with III 8–12 rays. Caudal emarginate, truncate, or rounded. Pectorals rounded, usually symmetrical or subsymmetrical, with 15 to 20 rays; a more or less developed dermal, scaly process above axilla. Ventrals below the pectorals, close together, with a strong spine. Supraoccipital and parietal bones extending forwards to between postfrontal processes. Vertebræ 24 (10+14).

Tropical and temperate seas.



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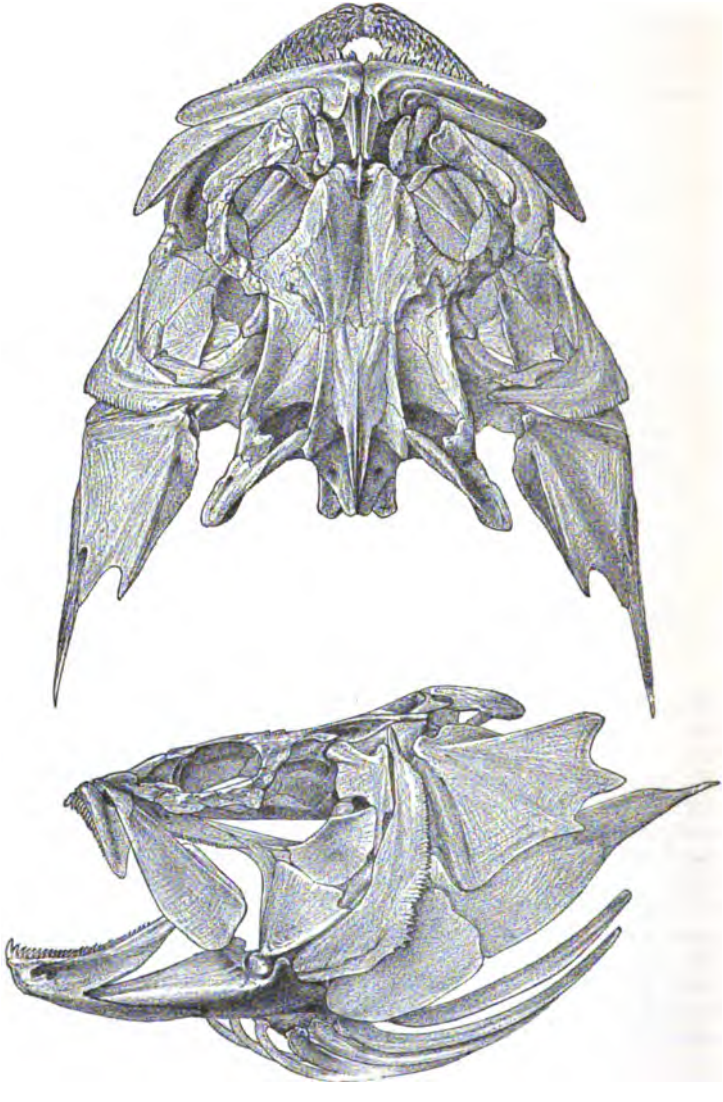

Fig. 13.—Upper and side views of skull of *Epinephelus itaiara*.

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The following are the principal cranial differences, which, combined with other characters, are used in the definition of the subgenera into which it appears natural and convenient to divide the numerous species grouped together under *Epinephelus*:—

A. A transverse ridge on the posterior part of the frontals, in front of the supraoccipital, connecting the parietal crests; frontal bones without processes or longitudinal ridges on the upper surface.

1. Posterior processes of præmaxillaries not extending to between the frontals ..... I. *Variola.*
2. Posterior processes of præmaxillaries extending to between the frontals ..... II. *Petrometopon.*

B. No transverse ridge on the frontals.

1. Parietal crests not produced forwards on the frontals; frontals with a process or knob on each side behind the interorbital area; præmaxillary processes fitting into a cavity at the anterior extremity of the frontals or in an emargination of these bones ..... III. *Cephalopholis.* IV. *Epinephelus.*

2. Parietal crests produced forwards on the frontals.

*a.* Frontals with a process or knob on each side behind the interorbital area; supraoccipital and parietal crests produced forwards on the frontals; præmaxillary processes fitting into a cavity at the anterior extremity of the frontals.

*α.* Supraoccipital and parietal crests not extending to between the orbits ..... V. *Alphestes.*

*β.* Supraoccipital and parietal crests extending to between the orbits ..... VI. *Dermatolepis.*

*b.* Frontals without processes on the upper surface; parietal crests extending to between the orbits; præmaxillary processes not extending to the frontals. VII. *Mycteroperca.*

*Synopsis of the Species.*

I. Dorsal with 9 spines.

A. One or two curved canines on each side of the mandible besides those in front. (VARIOLA.)

Caudal crescentically notched; dorsal with 14 soft rays, anal with 8 ..... 1. *louti*, p. 173.

B. No curved canines on the sides of the mandible. (PETROMETOPON and CEPHALOPHOLIS.)

1. Anal with 8 soft rays.

*a.* Caudal emarginate; dorsal with 15 soft rays. 2. *mars*, p. 175.

*b.* Caudal rounded.

*α.* Sc. 80–95 $\frac{6-9}{27-33}$; l. l. 50–56; second anal spine much shorter than soft rays.

Opercular flap very obtuse, its upper border very convex ..... 3. *guttatus*, p. 176.

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Opercular flap pointed; ventrals not reaching anus ..... 4. *panamensis*, p. 177.
Opercular flap pointed; ventrals reaching anus ..... 5. *nigri*, p. 178.

β. Sc. 90–100 $\frac{8-9}{30-37}$; l. l. 46–53; second anal spine considerably longer than third, nearly as long as longest soft rays ..... 6. *pachycentrum*, p. 178.

γ. Sc. 97–120 $\frac{9-11}{35-40}$; l. l. 50–63; second and third anal spines equal, or second slightly longer, shorter than the soft rays.

Maxillary extending to below posterior border of eye, or a little beyond ..... 7. *boenack*, p. 180.
Maxillary extending far beyond vertical of posterior border of eye ..... 8. *cyanostigma*, p. 181.

2. Anal with 9 (exceptionally 8 or 10) soft rays.

*a.* Caudal truncate.

Dorsal with 15 soft rays; sc. 130–135 $\frac{10-11}{45-47}$; l. l. 70–75 ..... 9. *polleni*, p. 182.
Dorsal with 14 to 16 soft rays; sc. 90–110 $\frac{7-9}{32-35}$; l. l. 53–65 ..... 10. *punctatus*, p. 183.
Dorsal with 17 or 18 soft rays; sc. 100–115 $\frac{11-13}{43-48}$; l. l. 52–55 ..... 11. *rogaa*, p. 185.

*b.* Caudal emarginate ..... 12. *dubius*, p. 185.

*c.* Caudal rounded.

*a.* Sc. 110–140 $\frac{10-15}{40-52}$.

L. l. 75–82; depth of body rather less than length of head ..... 13. *tæniops*, p. 186.
L. l. 65–75; depth of body rather more than length of head ..... 14. *sonnerati*, p. 187.
L. l. 53–60; pectoral with a yellow border ..... 15. *nigripinnis*, p. 188.

β. Sc. 95–110 $\frac{9-10}{32-38}$; l. l. 50–55; pectoral $\frac{3}{5}$ to $\frac{3}{4}$ length of head ..... 16. *argus*, p. 189.

γ. Sc. 90–115 $\frac{7-10}{32-43}$; pectoral $\frac{4}{7}$ to $\frac{4}{5}$ length of head.

* Depth of body $2\frac{3}{4}$ to 3 times in total length.

Ventrals reaching anus; pectoral dark, with broad yellow edge ..... 17. *hemistictus*, p. 190.
Ventrals not reaching anus; dorsal spines increasing in length to the third; anal spines much shorter than soft rays; pectoral pale, with or without blue spots ..... 18. *miniatus*, p. 191.
Ventrals not reaching anus; dorsal spines increasing in length to the fourth or fifth; anal spines much shorter than soft rays. 19. *urodelus*, p. 192.
Second anal spine nearly as long as longest soft rays, about $\frac{3}{5}$ length of head ..... 20. *aurantius*, p. 193.

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** Depth of body $2\frac{1}{3}$ to $2\frac{2}{3}$ times in total length.
21. *sexmaculatus*, p. 194.

♂. Sc. 75–90 $\frac{5-7}{28-30}$; l. l. 46–56; depth of body $2\frac{1}{3}$ to $2\frac{2}{3}$ times in total length.

Dorsal with 14 soft rays..... 22. *leopardus*, p. 195.
Dorsal with 17 soft rays..... 23. *acanthistius*, p. 196.

II. Dorsal with 11 (rarely 10 or 12) spines; anal with 8 or 9 soft rays; canines usually distinct, except in old specimens; opercular spines three. (EPINEPHELUS.)

A. Teeth in narrow bands, in two series on the sides of the mandible in the adult as well as in the young; scales usually mostly ciliated, at least below the lateral line.

1. Dorsal with 11 (exceptionally 10 or 12) spines.

*a.* Anal with 8 (exceptionally 9) soft rays.

*a.* Caudal truncate or emarginate; dorsal with 15 to 19 soft rays.

* Second dorsal spine nearly twice as long as third.
24. *spiniger*, p. 197.

** Second dorsal spine not longer than third.

† Depth of body $2\frac{1}{3}$ to $2\frac{2}{3}$ times in total length; sc. 130–150 $\frac{20-25}{55-65}$ ..... 25. *flavocæruleus*, p. 198.

†† Depth of body 3 to $3\frac{1}{4}$ times in total length.

‡ Opercular spines nearly equidistant.

§ Dorsal with 16 to 19 soft rays; sc. 120–145 $\frac{18-20}{42-56}$.

Depth of body 3 to $3\frac{1}{4}$ times in total length; ventral as long as pectoral; dorsal with 18 or 19 (exceptionally 17) soft rays ..... 26. *undulosus*, p. 199.

Depth of body $3\frac{1}{4}$ to $3\frac{1}{2}$ times in total length; ventral a little shorter than pectoral; dorsal with 16 to 18 soft rays. 27. *alexandrinus*, p. 200.

§§ Dorsal with 15 to 17 soft rays; sc. 100–140 $\frac{12-18}{43-55}$; ventral a little shorter than pectoral; body without dark longitudinal lines.

Diameter of eye 7 times in length of head in the adult; sc. 100 $\frac{15}{50}$; caudal emarginate ..... 28. *chrysotænia*, p. 201.

Diameter of eye 5 times in length of head in the adult; sc. 110–125 $\frac{12-15}{43-50}$; caudal emarginate ..... 29. *areolatus*, p. 202.

Diameter of eye 6 times in length of head in the adult; sc. 115–140 $\frac{13-18}{46-55}$; caudal truncate or slightly emarginate..... 30. *chlorostigma*, p. 203.

‡‡ Middle opercular spine much nearer lower than upper; sc. 120–150 $\frac{15-20}{48-58}$.

Maxillary naked ..... 31. *goreensis*, p. 204.
Maxillary scaly ..... 32. *coromandelicus*, p. 204.

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β. Caudal truncate; dorsal with 13 or 14 soft rays; lower opercular spine not extending further back than upper; scales on opercles ciliated .. 33. *caninus*, p. 205.

γ. Caudal truncate or subtruncate in the adult, rounded in the young; none of the scales on the head ciliated.

* Lower opercular spine not extending further back than upper; dorsal with 12 or 13 soft rays. 34. *latifasciatus*, p. 206.

** Lower opercular spine further back than upper; dorsal with 14 or 15 soft rays; l. l. 60–72.

Longest dorsal spine $\frac{1}{3}$ length of head .... 35. *præopercularis*, p. 207.
Longest dorsal spine $\frac{2}{5}$ to $\frac{1}{3}$ length of head. 36. *morrhua*, p. 208.

*** Lower opercular spine further back than upper; dorsal with 16 or 17 (rarely 15) soft rays; l. l. 50–60.

† Longest gill-rakers not longer than gill-fringes; longest dorsal spines as long as or a little shorter than longest soft rays ..... 37. *diacanthus*, p. 209.

†† Longest gill-rakers longer than gill-fringes.

Longest dorsal spine as long as or longer than longest soft rays; depth of body a little less than length of head; sc. 100–110 $\frac{11-12}{45-55}$ ..... 38. *catus*, p. 210.

Longest dorsal spine longer than longest soft rays; depth of body nearly equal to length of head; sc. 105–110 $\frac{12-15}{40-45}$..... 39. *maculatus*, p. 211.

Longest dorsal spine a little shorter than longest soft rays; depth of body a little less than length of head; sc. 110–115 $\frac{13-15}{45-50}$ ..... 40. *bleekeri*, p. 212.

δ. Caudal rounded.

* Dorsal with 13 soft rays; sc. 110–115 $\frac{13-16}{45-50}$; l. l. 70–76. 41. *brunneus*, p. 213.

** Dorsal with 14 soft rays or more.

† Interorbital width less than diameter of eye.

‡ Two strong spines at angle of præopercle, lower pointing downwards; dorsal with 15 soft rays; sc. 90–100 $\frac{9-12}{30-35}$; l. l. 52–56. 42. *sexfasciatus*, p. 214.

‡‡ Several enlarged serræ at angle of præopercle; dorsal with 15 to 18 soft rays.

§ Middle opercular spine nearer lower than upper.

Sc. 120 $\frac{20}{60}$; maxillary scaly ..... 43. *amblycephalus*, p. 215.

Sc. 100 $\frac{14}{42}$; maxillary naked ..... 44. *australis*, p. 215.

Sc. 100 $\frac{11-12}{45}$; maxillary scaly ..... 45. *dictiophorus*, p. 216.

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§§ Opercular spines equidistant; scales mostly ciliated, 85–110 $\frac{10-14}{34-45}$.

Pectoral $\frac{2}{3}$ length of head; sc. 95–110 $\frac{12-14}{34-45}$; third and fourth dorsal spines considerably longer than last ..... 46. *akaara*, p. 216.

Pectoral $\frac{2}{3}$ length of head; sc. 96 $\frac{11}{38}$; third and fourth dorsal spines considerably longer than last ..... 47. *chlorocephalus*, p. 217.

Pectoral $\frac{2}{3}$ length of head; sc. 85–95 $\frac{9-11}{35-45}$; dorsal spines subequal from the third or fourth ..... 48. *bontoides*, p. 218.

Pectoral nearly as long as head; sc. 85–95 $\frac{10-12}{40-45}$ ..... 49. *megachir*, p. 219.

§§§ Opercular spines equidistant; scales mostly smooth above lateral line, 95–115 $\frac{10-13}{37-42}$.

Depth of body $3\frac{1}{3}$ to $3\frac{2}{3}$ times in total length ..... 50. *gilberti*, p. 220.

Depth of body 3 to $3\frac{1}{3}$ times in total length; serræ at angle of præopercle very slightly enlarged..... 51. *trimaculatus*, p. 221.

Depth of body 3 to $3\frac{1}{3}$ times in total length; serræ at angle of præopercle rather strongly enlarged..... 52. *stoliczkæ*, p. 221.

†† Interorbital width nearly equal to diameter of eye.

‡ Depth of body at least 3 times in total length; dorsal with 14 or 15 soft rays.

Sc. 95–110 $\frac{13-15}{40}$; lower opercular spine further back than upper; opercular flap acutely pointed ..... 53. *æneus*, p. 222.

Sc. 110–130 $\frac{15-17}{50}$; lower opercular spine not further back than upper; opercular flap obtusely pointed, its upper border very convex..... 54. *dæmelii*, p. 223.

‡‡ Depth of body not 3 times in total length; dorsal with 15 or 16 soft rays; sc. 110 $\frac{14-15}{40}$.

55. *undulatostriatus*, p. 224.

*b*. Anal with 9 soft rays; dorsal with 13 to 16 soft rays.

Caudal truncate; serræ slightly enlarged at angle of præopercle; sc. 125 $\frac{30}{57}$ .... 56. *drummondhayi*, p. 224.

Caudal truncate in the adult; angle of præopercle with strong spines; sc. 115–120 $\frac{17-20}{48-52}$; young with blue spots ..... 57. *niveatus*, p. 225.

Caudal rounded; angle of præopercle with strong spines; sc. 115–130 $\frac{15-18}{45-55}$; body barred ..... 58. *septemfasciatus*, p. 226.

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2. Dorsal with 10 spines and 16 to 18 soft rays; caudal rounded.

Sc. 90 $\frac{11}{33}$ ..... 59. *rivulatus*, p. 227.

Sc. 110–120 $\frac{12-15}{38-42}$ ..... 60. *analogus*, p. 228.

B. Teeth in three or more series on the sides of the mandible in the adult.

1. Third, fourth, or fifth dorsal spine much longer than the last, not or but slightly shorter than longest soft rays; lower opercular spine further back than upper.

*a*. Anal with 8 soft rays.

*a*. No scales on maxillary; caudal rounded or subtruncate in the adult.

* Sc. 85-110 $\frac{9-13}{35-43}$; l. l. 55-60.

† Longest dorsal spine $\frac{1}{3}$ to $\frac{2}{3}$ length of head.

Opercular spines equidistant; lower jaw strongly projecting; middle soft dorsal rays longest ..... 61. *ascensionis*, p. 228.

Middle opercular spine nearer lower than upper; lower jaw feebly projecting .... 62. *labriformis*, p. 230.

Opercular spines equidistant; anterior soft dorsal rays longest ..... 63. *awoara*, p. 230.

†† Longest dorsal spine $\frac{1}{2}$ length of head. 64. *rhyncholepis*, p. 231.

** Sc. 100–120 $\frac{12-17}{42-55}$; l. l. 60–80; fourth or fifth dorsal spine longest ..... 65. *gigas*, p. 231.

*β*. Maxillary scaly; caudal rounded; sc. 112-$\frac{21}{59}$; third dorsal spine longest..... 66. *cernioides*, p. 233.

*γ*. Maxillary more or less scaly; caudal truncate in the adult.

Sc. 140–150 $\frac{18-20}{45-50}$, mostly ciliated..... 67. *jayakari*, p. 233.

Sc. 120 $\frac{16}{20}$, mostly ciliated; second dorsal spine much longer than third ..... 68. *albopunctulatus*, p. 234.

Sc. 110–125 $\frac{13-18}{45-55}$, mostly ciliated; second or third dorsal spine longest ..... 69. *striatus*, p. 235.

Sc. 90–110 $\frac{11-15}{35-45}$, smooth above lateral line; third or fourth dorsal spine longest ..... 70. *corallicola*, p. 236.

*b*. Anal with 9 (exceptionally 8) soft rays; second or second and third dorsal spines longest.

Caudal truncate in the young, slightly emarginate in the adult; sc. 130–140 $\frac{18-20}{60}$; dorsal with 16 or 17 soft rays ... 71. *morio*, p. 237.

Caudal rounded; sc. 86–107; dorsal with 14 or 15 soft rays ..... 72. *nigritus*, p. 238.

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2. Dorsal spines subequal from the third or fourth, which is not longer than longest soft rays; lower opercular spine further back than upper; upper border of opercular flap feebly curved or nearly straight.

*a.* Anal with 8 soft rays.

*a.* Diameter of eye 4 to 5½ times in length of head.

Caudal subtruncate in the adult; snout not longer than diameter of eye; sc. 100–120 $\frac{9-12}{36-43}$; l. l. 50–62 ..... 73. *fasciatus*, p. 238.

Caudal rounded; snout longer than diameter of eye; præopercular border angular; interorbital width 8 times in length of head; sc. 100–110 $\frac{10-11}{40}$; l. l. 60–65 .. 74. *nebulosus*, p. 240.

Caudal rounded; præopercular border rounded; maxillary scaly; sc. 95–105 $\frac{12-14}{45-50}$ 75. *polyphekadion*, p. 240.

Caudal rounded; præopercular border rounded; maxillary naked or with a few scales; sc. 95–120 $\frac{10-13}{32-44}$ ..... 76. *merra*, p. 241.

Caudal rounded; depth of body nearly equal to length of head; maxillary scaly; sc. 110 $\frac{12-13}{40-45}$ ..... 77. *socialis*, p. 243.

*β.* Diameter of eye 5 to 8 times in length of head.

Sc. 100–120 $\frac{12-15}{35-45}$ ..... 78. *tauvina*, p. 244.

Sc. 140 $\frac{24}{60}$ ..... 79. *multinotatus*, p. 246.

*b.* Anal with 9 soft rays..... 80. *micronotatus*, p. 246.

3. Dorsal spines subequal, or last not very much shorter than third or fourth; lower opercular spine not further back than upper; caudal rounded.

*a.* Interorbital width 6 to 9 times in length of head; dorsal with 15 or 16 soft rays; pectoral at least ⅔ length of head.

Opercular flap acutely pointed, the upper border feebly curved ..... 81. *cæruleopunctatus*, p. 246.

Opercular flap obtusely pointed, the upper border strongly curved ..... 82. *summana*, p. 248.

*b.* Interorbital width 3½ to 7 times in length of head; diameter of eye 5 to 12 times in length of head; pectoral not more than ⅔ length of head.

Scales smooth or feebly ciliated, 110–145 $\frac{15-20}{45-60}$; tubes of lateral line not branched. 83. *fuscoguttatus*, p. 249.

Scales smooth or feebly ciliated, 100–110 $\frac{14-16}{42-50}$; tubes of lateral line branched.... 84. *lanceolatus*, p. 251.

Scales all rough and ciliated, 115–135 $\frac{14-16}{35-45}$; tubes of lateral line branched ..... 85. *itaiara*, p. 252.

III. Dorsal with 11 spines; anal with 9 soft rays; teeth very small, in two series on the sides of the mandible; canines very small or absent; three opercular spines; lower præopercular border notched in front of the angle, which is armed with an antrorse spine. (ALPHESTES.)

Second anal spine as long as third; gill-rakers short ..... 86. *afer*, p. 254.

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Second anal spine longer than third, nearly as long as longest soft rays; longest gill-rakers as long as gill-fringes ..... 87. *multiguttatus*, p. 255.

IV. Dorsal with 11 spines; anal with 9 or 10 soft rays; teeth very small, in two series on the sides of the mandible; canines indistinct or absent; lower opercular spine absent; head and body very strongly compressed; scales all cycloid. (DERMATOLEPIS.)

Præopercle subentire; pectoral not ⅔ length of head ..... 88. *dermatolepis*, p. 256.
Præopercle serrated; pectoral as long as head ..... 89. *inermis*, p. 257.
Præopercle serrated; pectoral ⅔ to ⅘ length of head ..... 90. *striolatus*, p. 257.

V. Dorsal with 11 spines; anal with 10 to 12 soft rays; canine teeth well developed; teeth in two series on the sides of the mandible; opercular spines three. (MYCTEROPERCA.)

A. Scales on head cycloid; dorsal with 15 to 19 soft rays.

1. Gill-rakers very few and short, 6 to 8 (besides rudiments) on lower part of anterior arch; scales 125–135 $\frac{18-20}{50-55}$.

Nostrils normal; caudal crescentically emarginate ..... 91. *venenosus*, p. 259.
Nostrils very close together (in the adult), the posterior very large; caudal truncate or slightly emarginate ..... 92. *tigris*, p. 259.

2. Gill-rakers moderate or long, 10 to 17 (besides rudiments) on lower part of anterior arch.

*a*. Scales 130–145.

*a*. Caudal crescentically emarginate.

Nostrils normal; anal rounded..... 93. *microlepis*, p. 260.
Nostrils very close together (in the adult), the posterior very large; anal angulated. 94. *falcatus*, p. 261.

*β*. Caudal truncate or slightly emarginate.

Nostrils very close together, the posterior very large; anal angulated ..... 95. *rosaceus*, p. 262.
Nostrils normal; anal rounded..... 96. *jordani*, p. 263.

*b*. Scales 90–125.

*a*. Second dorsal spine longest; caudal slightly emarginate; nostrils close together, posterior very large. 97. *olfax*, p. 263.

*β*. Third and fourth dorsal spines longest.

* Caudal crescentically emarginate; maxillary extending to below centre of eye.

Nostrils close together, posterior very large; scales 100..... 98. *calliurus*, p. 264.
Nostrils normal; scales 110 ..... 99. *dimidiatus*, p. 264.

** Caudal truncate or slightly emarginate; maxillary extending to below posterior border of eye, or beyond.

Anal rounded; interorbital region convex. 100. *bonaci*, p. 265.
Anal rounded; interorbital region concave. 101. *interstitialis*, p. 266.
Anal angulate; interorbital region flattish. 102. *xenarchus*, p. 266.

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3. Gill-rakers long and slender, 22 to 35 on lower part of anterior arch; scales 90–115 $\frac{14-16}{40-46}$.

Caudal truncate or feebly emarginate .... 103. *ruber*, p. 267.
Caudal crescentically emarginate ..... 104. *pardalis*, p. 268.

B. Scales on head ciliated; dorsal with 19 to 21 soft rays; sc. 130–150 $\frac{21-25}{55-65}$; caudal truncate ..... 105. *dermopterus*, p. 269.

I. VARIOLA, Swains.—Dorsal with 9 spines; anal with 8 soft rays. One or two curved canines on each side of the mandible, besides those in front. Frontal bones without anterior excavation for the reception of the posterior processes of the præmaxillaries, without processes on the upper surface; an angular ridge across the posterior portion of the frontals in front of the supraoccipital, connecting the parietal crests; supraoccipital and parietal crests not produced forwards.

Fig. 14.—Upper view of cranium of *Epinephelus louti*.

### 1. Epinephelus louti.

Perca louti, *Forsk. Descr. Anim.* p. 40 (1775).
Bodianus louti, *Bl. Schn. Syst.* p. 332 (1801); *Lacép. Poiss.* iv. p. 286 (1802).
Labrus punctulatus, *Lacép. op. cit.* iii. pp. 431, 477, pl. xvii. fig. 2 (1802).
Serranus punctulatus, *Cuv. & Val.* ii. p. 367 (1828), & ix. p. 435 (1833); *Quoy & Gaim. Voy. Astrol., Poiss.* p. 654, pl. iii. fig. 2 (1833).
Serranus luti, part., *Cuv. & Val. t. c.* p. 363.
Serranus louti, *Rüpp. Atlas, Fische Roth. M.* p. 106, pl. xxvi. fig. 2 (1828); *Günth.* i. p. 101 (1859), *and Fische Südsee*, p. 2, pl. i. (1873).

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Serranus flavimarginatus, *Rüpp. l. c.* p. 109; *Günth.* i. p. 103.
Serranus phœnistomus, *Swains. N. H. Fish.* ii. p. 201 (1839).
Variola longipinna, *Swains. l. c.* p. 202.
Serranus melanotænia, *Bleek. Act. Soc. Sc. Ind. Néerl.* ii. 1857, *Vischf. Amb.* p. 33; *Günth.* i. p. 504.
Pseudoserranus louti, *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 687, *and Fische Roth. M.* p. 7 (1884).
Variola flavimarginata, *Bleek. Verh. Ak. Amst.* iv. no. 2, 1873, p. 9, *and Atlas Ichth.* vii. p. 23, pl. cclxxxix. fig. 1 (1876).
Variola louti, *Bleek. ll. cc.* pp. 10, 24, pl. cccxlviii. fig. 3; *Day, Fish. Ind.* p. 26, pl. vii. fig. 3 (1875), *and Faun. Ind., Fish.* i. p. 459, fig. (1889).

D. IX 14. A. III 8. Sc. 115–145 $\frac{12-14}{54-60}$; l. l. 76–100.

Teeth forming narrow bands, in two or three series on the sides of the mandible, which is armed with one or two curved canines on each side in addition to the anterior, which are strong. Depth of body 3 to $3\frac{1}{2}$ times in total length, length of head $2\frac{4}{5}$ to 3 times. Snout $1\frac{1}{2}$ to twice as long as diameter of eye, which is $4\frac{1}{2}$ (half-grown specs.) to 7 times (full-grown) in length of head; interorbital width 5 to 7 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity $\frac{3}{5}$ to $\frac{3}{4}$ diameter of eye; præopercle very finely serrated, the serræ slightly enlarged at the angle, which is rounded; the serræ entirely disappearing in the adult; middle opercular spine nearer lower than upper, lower further back than upper; opercular flap pointed; cheeks, opercles, and occiput with cycloid scales, rest of head naked. Gill-rakers 7 to 9 (and 8 to 10 rudiments) on lower part of anterior arch, the longest shorter than the gill-fringes. Dorsal originating above base of pectoral; spines increasing in length to the third, which is about $\frac{1}{3}$ length of head, rest subequal; soft portion pointed, the posterior rays more or less produced in the adult. Pectoral $\frac{2}{3}$ length of head, or somewhat more. Ventral longer than pectoral, the second soft ray more or less produced in the adult, reaching anus or origin of anal, or a little beyond. Third anal spine a little longer than second; soft portion pointed, like dorsal. Caudal crescentically notched, with the outer rays more or less produced. Lateral line forming a strong curve. Scarlet or carmine, all over with small round lilac, bluish-white, or red spots; soft dorsal, pectoral, anal, and caudal with broad yellow edge posteriorly.

Total length 410 millim.

Indian and Western South Pacific Oceans, from the Red Sea and Tropical East Africa to the Paumotu Archipelago.

| | | |
|---|---|---|
| *a.* Ad., stffd. | Red Sea. | |
| *b.* Ad., skin. | Zanzibar. | Sir Lambert Playfair [P.]. |
| *c.* Ad. | Seychelles. | Prof. E. P. Wright [C.]. |
| *d, e, f.* Ad., stffd. | Mauritius. | |
| *g.* Hgr. | Mauritius. | Zoological Society. |
| *h.* Hgr. | Mauritius. | P. L. Sclater, Esq. [P.]. |
| *i.* Ad. | Providence I., Mascarenes. | H.M.S. 'Alert.' |

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| | | |
|---|---|---|
| *k*, *l*. Ad. & hgr. | Manado, Celebes. | Dr. A. B. Meyer [C.]. |
| *m*. Hgr. | Amboyna. | |
| *n*. Ad., skin. | Timor. | |
| *o*. Ad., stffd. | Aneiteum, New Hebrides. | |
| *p*. Ad., skin. | Aneiteum, New Hebrides. | |
| *q*–*r*. Ad. | Samoa. | Rev. S. J. Whitmee [C.]. |
| *s*. Ad. | Meduro, Marshall Ids. | Museum Godeffroy. |
| *t*. Hgr., skel. | Mauritius. | |

II. PETROMETOPON, Gill.—Dorsal with 9 spines; anal with 8, rarely 9, soft rays. No curved canines on the sides of the mandible. Frontal bones with anterior groove or excavation for the reception of the posterior processes of the præmaxillaries, without processes on the upper surface; a curved or angular ridge across the posterior portion of the frontals, in front of the supraoccipital, connecting the parietal crests; supraoccipital and parietal crests not produced forwards.

Fig. 15.—Upper view of cranium of *Epinephelus guttatus*.

### 2. Epinephelus mars.

Serranus mars, *De Vis*, *Proc. Linn. Soc. N. S. W.* ix. 1884, p. 390.

D. IX 15. A. III 8.

Depth of body $3\frac{1}{2}$ times in total length, length of head $2\frac{3}{5}$ times. Profile of head convex; snout pointed, a little longer than diameter of eye, which is $4\frac{3}{4}$ times in length of head; maxillary reaching

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far beyond vertical of posterior border of eye; præopercle minutely denticulated. Spinous portion of dorsal lower than the soft, which is obtusely pointed. Pectoral long, reaching nearly to base of anal. Second anal spine longer and much stronger than third, $\frac{1}{3}$ length of head. Caudal emarginate. Uniform dark brown; soft dorsal and anal with a pale intramarginal band; caudal with an oblique white bar on each lobe, converging backwards.

Total length 175 millim.

Cardwell, Queensland Coast.

### 3. Epinephelus guttatus.

? *Willoughby, Hist. Pisc.*, App. pl. vi. fig. 1 (1686).
Perca guttata, part., *Linn. S. N.* i. p. 485 (1766).
Perca guttata, *Bloch, Ausl. Fische*, vi. p. 89, pl. cccxii. (1792).
Sparus cruentatus, *Lacép. Poiss.* iv. p. 156, pl. iv. fig. 1 (1802).
Serranus coronatus, *Cuv. & Val.* ii. p. 371 (1828); *Günth.* i. p. 124 (1859).
Perca punctata, *Gronow, Cat.* p. 109 (1854).
Serranus guttatus, *Casteln. Anim. Amér. Sud*, ii. *Poiss.* p. 1 (1855).
Serranus apiarius, *Poey, Mem. Cuba*, ii. 1860, p. 143.
Petrometopon guttatus, *Poey, Repert. Cuba*, ii. 1868, p. 288.
Petrometopon apiarius, *Poey, l. c.*
Epinephelus guttatus, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 125; *Jord. & Swain, t. c.* p. 398.
Bodianus cruentatus, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 378.

D. IX 14–15. A. III 8. Sc. 85–95 $\frac{6-8}{27-30}$; l. l. 50–56.

Teeth forming rather narrow bands, in three series on the sides of the mandible; canines strong. Depth of body equal to length of head, $2\frac{3}{4}$ to 3 times in total length. Snout as long as or a little longer than diameter of eye, which is contained 5 to $5\frac{1}{2}$ times in length of head; interorbital width $5\frac{1}{2}$ to 6 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity $\frac{2}{3}$ to $\frac{4}{5}$ diameter of eye; præopercle very finely serrated, the serræ slightly enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap very obtusely pointed; head covered with cycloid scales; maxillary naked or with few scales. Gill-rakers 9 to 11, and 7 to 9 rudiments, on lower part of anterior arch, the longest at least as long as gill-fringes. Dorsal originating above base of pectoral; spines increasing in length to the third, which is about $\frac{1}{3}$ length of head, and shorter than soft rays. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, as long as or a little longer than longest dorsal spine and shorter than soft rays. Caudal rounded. Scales strongly ciliated. Reddish grey with numerous vermilion spots, which are very close on the head, the ground-colour forming a dark network; or dusky olive with orange or red spots, which are few or absent on the top

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of the head; a series of three black spots may be present on the back, close to the base of the dorsal fin.

Total length 250 millim.

Atlantic coasts of Tropical America.

| | | |
|---|---|---|
| *a*. Ad. | Key West, Florida. | Prof. D. S. Jordan [C.]. |
| *b*. Yg., skin. | N. America. | Gronow Collection. |
| *c*. Ad. | Cuba. | Zoological Society. |
| *d*, *e*. Ad. & hgr., skin. | Jamaica. | Parnell Collection. |
| *f*–*h*. Ad. | St. Croix. | |
| *i*. Ad. | Barbadoes. | Mr. Ehrhardt [C.]. |
| *k*–*l*. Ad. & yg. | Dominica. | |
| *m*. Hgr., skin. | Trinidad. | J. B. Richardson, Esq. [P.]. |
| *n*. Ad., skin. | W. Indies. | |
| *o*. Hgr. | Puerto Cabello. | |
| *p*, *q*. Ad. | S. America. | Sir R. Schomburgk [P.]. |
| *r*. Skeleton. | W. Indies. | |

### 4. Epinephelus panamensis.

Serranus panamensis, *Steind. Sitzb. Ak. Wien*, lxxii. i. 1875, p. 551, pl. i. fig. 1.

Enneacentrus panamensis, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 398.

Bodianus panamensis, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 378.

D. IX 14. A. III 8. Sc. circa 80; l. l. 51–53.

Teeth forming moderately broad bands, in four series on the sides of the mandible; canines small. Depth of body 3 times in total length, length of head $2\frac{3}{4}$ times. Snout longer than diameter of eye, which is nearly 6 times in length of head and greater than interorbital width; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye, the width of its distal extremity $\frac{2}{3}$ diameter of eye; præopercle very finely serrated, rounded; middle opercular spine nearer lower than upper; opercular flap pointed; head covered with cycloid scales; maxillary naked. Dorsal originating above base of pectoral; spines increasing in size to the fourth, which is about $\frac{1}{3}$ length of head, and much shorter than longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second anal spine slightly longer than third, nearly as long as longest dorsal spines, and shorter than the soft rays. Caudal rounded. Scales strongly ciliated. Purplish brown; light spots on the sides of the head; a large black spot behind the eye; body with 9 or 10 dark brown vertical bars; caudal and soft dorsal and anal fins edged with blue.

Total length 230 millim.

Panama.



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### 5. Epinephelus nigri. (Plate III. fig. A.)

Serranus nigri, *Günth.* i. p. 112 (1859); *Steind. Sitzb. Ak. Wien*, lxxx. i. 1880, p. 172, *and Denkschr. Ak. Wien*, xliv. 1881, p. 21.
Serranus lineo-ocellatus, *Guichen. in A. Dum. Arch. Mus.* x. 1860, p. 244.
Epinephelus nigri, *Bleek. Nat. Verh. Holl. Maatsch. Wet. Haarlem*, (2) xviii. 1863, p. 45.
Serranus cruentatus, *Peters, Mon. Berl. Ac.* 1876, p. 244, pl. —. fig. 1.

D. IX 14. A. III 8. Sc. 85–95 $\frac{7-9}{27-29}$; l. l. 50–53.

Teeth forming rather narrow bands, in three series on the sides of the mandible; canines moderate. Depth of body equal to length of head, 3 times in total length. Snout as long as or a little longer than diameter of eye, which is $4\frac{1}{3}$ to $5\frac{1}{2}$ times in length of head; interorbital width $5\frac{1}{2}$ to 6 times in length of head; lower jaw slightly projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity $\frac{2}{3}$ to $\frac{1}{3}$ diameter of eye; præopercle finely serrated, the serræ little enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower not extending further back than upper; opercular flap pointed; head covered with cycloid scales; maxillary entirely or partially naked. Gill-rakers 9 or 10, and 6 or 7 rudiments, on lower part of anterior arch, the longest as long as gill-fringes. Dorsal originating above base of pectoral; spines increasing in length to the third, which is about $\frac{1}{3}$ length of head and shorter than posterior soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral a little shorter, reaching anus. Second anal spine a little longer than third, as long as longest dorsal spines, and shorter than soft rays. Caudal rounded. Scales strongly ciliated. Brown or olive, with vermilion spots and rather indistinct dark vertical bars.

Total length 200 millim.; reaches to 280.

West Coast of Tropical Africa.

| | | |
|---|---|---|
| *a*. Hgr. | Niger. | Mr. Fraser [C.]. (Type.) |
| *b–c*. Ad. & hgr. | Ancobra R., Gold Coast. | Major Burton & Capt. Cameron [P.]. |
| *d*. Ad. | W. coast of Africa. | |

### 6. Epinephelus pachycentrum.

Serranus pachycentron, *Cuv. & Val.* ii. p. 295* (1828); *Macleay, Proc. Linn. Soc. N. S. W.* v. 1880, p. 314.
Serranus guttatus (*non Bl.*), *Cuv. & Val. t. c.* p. 359.

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* Type (a skin in the Paris Museum, no. 7432) examined.

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Serranus zananella (*non C. & V.*), *Bleek. Verh. Batav. Gen.* xxii. 1849, p. 32; *Günth.* i. p. 116 (1859).
Serranus microprion, *Bleek. Nat. Tijdschr. Nederl. Ind.* iii. 1852, p. 552.
Serranus microprion, part., *Günth.* i. p. 116 (1859).
Epinephelus microprion, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 155, *and Atlas Ichth.* vii. p. 39, pl. cclxxx. fig. 1 (1876).
Epinephelus boelang (*non C. & V.*), *Bleek. Verh. Akad. Amst.* xiv. 1873, no. 2, p. 49, *and Atl. Ichth.* vii. p. 40, pl. cccxlvi. fig. 5 (1876).

D. IX 15–16. A. III 8. Sc. 90–100 $\frac{8-9}{30-37}$; l. l. 46–53.

Teeth forming rather narrow bands, in three series on the sides of the mandible; canines moderate or strong. Depth of body $2\frac{2}{3}$ to 3 times in total length, length of head $2\frac{1}{2}$ to $2\frac{4}{5}$ times. Snout as long as or slightly longer than the eye, the diameter of which is 4 to 5 times in length of head; interorbital width 6 to 7 times in length of head; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye, the width of its distal extremity a little less than the diameter of the eye; præopercle very finely serrated, the serræ scarcely enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper; opercular flap obtusely pointed, upper border very convex; head covered with cycloid scales, the snout and maxillary often naked. Gill-rakers 9 or 10, and 6 or 7 rudiments, on lower part of anterior arch, the longest at least as long as gill-fringes. Dorsal originating above base of pectoral; spines increasing in length to the third, which is about $\frac{1}{3}$ length of head; posterior soft rays considerably longer. Pectoral $\frac{3}{4}$ to $\frac{4}{5}$ length of head. Ventrals much shorter, not reaching anus. Second anal spine considerably longer than third, nearly as long as longest soft rays, $\frac{2}{5}$ to $\frac{1}{2}$ length of head. Caudal rounded. Scales strongly ciliated. Brown, uniform or with darker vertical bars; with or without blue dots on the head and anterior part of the body; fins dark, dorsal and anal edged with yellow.

Total length 190 millim.; reaches to 215.

Indian and Western Pacific Oceans, from the Bay of Bengal to the Louisiade Archipelago.

| | | |
|---|---|---|
| *a*. Ad. | Ceylon. | H. Nevill, Esq. [P.]. |
| *b*. Yg. | Madras. | F. Day, Esq. [P.]. |
| *c*. Ad. | Singapore. | Governor of Singapore [P.]. |
| *d–e, f–g*. Hgr. | Malay Archipelago. | Bleeker Collection. |
| *h, i*. Ad., skins. | Louisiade Archipelago. | H.M.S. 'Rattlesnake.' |
| *k*. Ad., skin. | Louisiade Archipelago. | J. Macgillivray, Esq. [C.]. |
| *l*. Hgr. | —— ? | Lidth de Jeude Collection. |



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### 7. Epinephelus boenack.

*Russell, Descr. Fish.* ii. p. 22, pl. cxxix. (1803).
Bodianus boenack, *Bloch, Ausl. Fische*, iv. p. 43, pl. ccxxvi. (1790).
Perca fusca, *Thunb. Vet.-Akad. Handl.* (*Stockh.*) xiv. 1793, p. 297, pl. ix.
Sciæna formosa, *Shaw, Nat. Misc.* xxiii. pl. cvii. (——).
Serranus formosus, *Cuv. & Val.* ii. p. 311 (1828); *Richards. Rep. Ichth. China*, p. 233 (1846); *Günth.* i. p. 154 (1859); *Day, Fish. Malab.* p. 7 (1865); *Kner, Novara, Fische*, p. 26 (1865).
Serranus boelang, *Cuv. & Val.* ii. p. 308, & vi. p. 514 (1830); *Quoy & Gaim. Voy. Astrol., Poiss.* p. 657, pl. iii. fig. 4 (1833); *Playf. & Günth. Fish. Zanzib.* p. 2 (1866); *Day, Fish. Ind.* p. 26, pl. vii. fig. 2 (1875), *and Faun. Ind., Fish.* i. p. 458 (1889).
Serranus spiloparæus, *Cuv. & Val.* ii. p. 338*; *Günth. t. c.* p. 125.
Serranus boenack, *Cuv. & Val. t. c.* p. 362; *Peters, Mon. Berl. Ac.* 1865, p. 105; *Kner, Novara, Fische*, p. 21 (1865); *Day, Fish. Ind.* p. 23, pl. vi. fig. 1 (1873), *and Faun. Ind., Fish.* i. p. 455 (1889).
? Serranus nigrofasciatus, *Hombr. & Jacq. Voy. Pôle Sud, Poiss.* p. 36, pl. ii. fig. 1 (1842).
Serranus stigmapomus, *Richards. l. c.* p. 232; *Günth.* i. p. 111; *Macleay, Proc. Linn. Soc. N. S. W.* v. 1880, p. 314.
Serranus boenack, part., *Günth. t. c.* p. 112.
Serranus microprion, part., *Günth. t. c.* p. 116.
Epinephelus boenack, *Bleek. Versl. Akad. Amst.* (2) ii. 1868, p. 338.
Epinephelus formosus, *Bleek. Verh. Akad. Amst.* xiv. 1873, no. 2, p. 59, *and Atl. Ichth.* vii. p. 44, pl. cccxl. fig. 3 (1876).

D. IX 15–17. A. III 8. Sc. 97–120 $\frac{9-11}{35-40}$; l. l. 50–63.

Teeth forming rather narrow bands, in two or three series on the sides of the mandible; canines moderate or strong. Depth of body $2\frac{2}{3}$ to 3 times in total length, length of head $2\frac{2}{3}$ to $2\frac{4}{5}$ times. Snout $1\frac{1}{4}$ to $1\frac{1}{2}$ diameter of eye, which is $4\frac{1}{2}$ to 6 times in length of head; interorbital width 6 to 8 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye, or a little beyond, the width of its distal extremity nearly equal to diameter of eye; præopercular border rounded, very finely serrated, the serræ slightly enlarged at the angle; middle opercular spine nearer lower than upper, lower not so far back as upper; opercular flap obtusely pointed, its upper border sinuous; head nearly entirely covered with cycloid scales, the maxillary, however, often naked. Gill-rakers 9 to 11, and 6 or 7 rudiments, on lower part of anterior arch, the longest at least as long as gill-fringes. Dorsal originating above base of pectoral; spines increasing in length to the third, which is about $\frac{1}{2}$ length of head; posterior soft rays considerably longer. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral a little shorter, reaching anus or not quite so far. Second anal spine slightly longer than third, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, and shorter than the soft rays. Caudal rounded. Scales strongly

* Type (Paris Mus. no. 7172) examined. The specimen is a bad skin, in which the last rays of the dorsal have been broken.

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ciliated. Brown or reddish, with or without undulous or oblique blue lines, or with dark brown vertical bars; traces of both kinds of markings may exist in one specimen (*h*) on the body, or the blue lines may be present on the head and the dark bars on the body (as in the type figured by Bloch *); membranes between dorsal spines tipped with black.

Total length 330 millim.

Indian and Western Pacific Oceans, from Zanzibar to China, New Guinea, and North-west Australia.

| | | |
|---|---|---|
| *a*, *b*, *c*. Hgr., skins. | Zanzibar. | Sir Lambert Playfair [P.]. |
| *d*. Hgr., skin. | Madras. | J. E. Boileau, Esq. [P.]. |
| *e*. Ad., stffd. | Madras. | East India Museum. |
| *f*. Ad., stffd. | Madras. | E. Thurston, Esq. [C.]. |
| *g*–*i*. Ad. & hgr. | Madras. | E. Thurston, Esq. [C.]. |
| *k*. Hgr. | Madras. | F. Day, Esq. [P.]. |
| *l*. Ad. | Vizagapatam Coast. | Capt. Mitchell [P.]. |
| *m*, *n*. Ad. & hgr. | China. | |
| *o*–*p*. Hgr. | China. | J. R. Reeves, Esq. [P.]. |
| *q*. Hgr., skin. | China. | J. R. Reeves, Esq. [P.]. |
| *r*–*s*. Hgr. | Shanghai. | |
| *t*. Ad. | Formosa. | R. Swinhoe, Esq. [P.]. |
| *u*. Ad. | Malay Archipelago. | |
| *v*. Ad. | Java. | |
| *w*, *x*. Hgr. | Amboyna. | |

## 8. Epinephelus cyanostigma.

Serranus cyanostigma, *Cuv. & Val.* ii. p. 359 (1828); *Bleek. Verh. Batav. Gen.* xxii. 1849, p. 32; *Günth.* i. p. 117 (1859).

Epinephelus cyanostigma, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 251, *and Atlas Ichthyol.* vii. p. 42, pl. cccxx. fig. 3 (1876).

D. IX 16. A. III 8. Sc. 100–110 $\frac{9-11}{38-40}$; l. l. 50.

Teeth forming rather narrow bands, in three series on the sides of the mandible; canines moderate. Depth of body 2¼ to 3 times in total length, length of head 2⅔ to 3 times. Snout about 1½ diameter of eye, which is 5½ to 6½ times in length of head; interorbital width 6 to 7 times in length of head; lower jaw projecting; maxillary extending much beyond vertical of posterior border of eye, the width of its distal extremity equal to diameter of eye; præopercle very finely serrated, the serræ slightly enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower not extending so far back as upper; opercular flap very obtusely pointed; head entirely covered with cycloid scales. Gill-rakers as long as gill-fringes, 17 on lower part of anterior arch. Dorsal originating above base of

* Whose description and figure, I am fully convinced, are not made up from two specimens, as suggested by Bleeker.

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pectoral; spines increasing in length to the third, which is $\frac{2}{7}$ to $\frac{1}{3}$ length of head, and much shorter than the posterior soft rays. Pectoral $\frac{5}{7}$ length of head. Ventral a little shorter, not reaching anus. Second and third anal spines equal, $\frac{1}{3}$ length of head, and much shorter than the soft rays. Caudal rounded. Scales strongly ciliated. Red, with several rather indistinct vertical dark-brown bars, and dotted all over, fins included, with blue.

Total length 250 millim.

Malay Archipelago.

*a*. Ad. Amboyna.

### 9. Epinephelus polleni.

Epinephelus polleni, *Bleek. Versl. Akad. Amst.* (2) ii. 1868, p. 336, *and in Poll. & Van Dam, Rech. Faun. Madag.* iv. p. 19, pl. vii. (1874); *Sauvage, Hist. Madag., Poiss.* p. 81, pl. viii. fig. 3 (1891).
Serranus polleni, *Day, Suppl. Fish. Ind.* p. 781 (1888), *and Faun. Ind., Fish.* i. p. 456 (1889).

D. IX 15. A. III 9. Sc. 130–135 $\frac{10-11}{45-47}$; l. l. 70–75.

Teeth forming narrow bands, in two or three series on the sides of the mandible; canines moderate. Depth of body 3 to $3\frac{1}{3}$ times in total length, length of head 3 to $3\frac{1}{4}$ times. Snout about once and a half diameter of eye, which is $5\frac{1}{2}$ times in length of head; interorbital width 6 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity nearly equal to diameter of eye; præopercle very finely serrated, the serræ slightly enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower not extending so far back as upper; opercular flap obtusely pointed, its upper border very convex; snout and maxillary naked, rest of head with cycloid scales. Gill-rakers long, much longer than gill-fringes, 17 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the third, which is about $\frac{1}{3}$ length of head, rest subequal; soft rays a little longer. Pectoral about $\frac{3}{4}$ length of head. Ventral nearly as long as pectoral, reaching anus. Second and third anal spines equal. Caudal squarely truncate. Scales strongly ciliated. Reddish, with pale blue, dark-edged, somewhat wavy longitudinal lines, which extend on the soft dorsal, anal, and caudal; three lines on each side of the head, connected with their fellows above, the middle one passing through the eyes, the lower crossing the upper lip; a dark stripe along the dorsal; fins pale.

Total length 340 millim.

Mascarene Sea. Coast of Madras?

| | | | |
|---|---|---|---|
| *a*. Ad., stffd. | Mauritius. | | |
| *b*. Ad. | Mauritius. | P. L. Sclater, Esq. [P.]. | |

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III. CEPHALOPHOLIS, Bl. Schn. (*Enneacentrus*, Gill).—Dorsal with 9 spines; anal with 9 (exceptionally 8 or 10) soft rays. No curved canines on the sides of the mandible. Frontal bones with anterior groove or concavity for the reception of the posterior processes of the præmaxillaries, and with a process or knob on each side behind the interorbital area; supraoccipital crest more or less produced forwards; parietal crests not produced on the frontals.

Fig. 16.—Upper view of cranium of *Epinephelus punctatus*.

## 10. Epinephelus punctatus.

? *Sloane, Voy. Jamaica*, ii. pl. ccxlvii. fig. 2 (1725).
*Catesby, Nat. Hist. Carol.* ii. pl. vii. fig. 2 (1743).
?? *Catesby, t. c.* pl. x. fig. 2.
*Parra, Hist. Nat. Cuba, Piez.* p. 7, pl. v. (1787).
Perca punctata, *Linn. S. N.* i. p. 485 (1766).
?? Labrus fulvus, *Linn. t. c.* p. 479.
Perca punctulata, *Gmel. S. N.* i. p. 1315 (1788).
Holocentrus auratus, *Bloch, Ausl. Fische*, iv. p. 75, pl. ccxxxvi. (1790).
Bodianus guativere, *Bl. Schn. Syst.* p. 336 (1801).
Gymnocephalus ruber, *Bl. Schn. l. c.* p. 346, pl. lxvii.
Serranus auratus, *Cuv. & Val.* ii. p. 364 (1828); *Peters, Mon. Berl. Ac.* 1865, p. 103.
Serranus ouatalibi, *Cuv. & Val. t. c.* p. 381; *Guichen. in R. de la Sagra, Hist. Cuba, Poiss.* p. 11 (1853); *Casteln. Anim. Amér. Sud*, ii. *Poiss.* p. 2, pl. i. fig. 3 (1855); *Günth.* i. p. 120 (1859).
Serranus guativere, *Cuv. & Val. t. c.* p. 383; *Steind. Verh. zool.-bot. Ges. Wien*, xvi. 1866, p. 776.
Serranus carauna, *Cuv. & Val. t. c.* p. 384; *Casteln. l. c.* p. 1, pl. i. fig. 1.

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Enneacentrus punctatus, *Poey, Repert. Cub.* ii. 1868, p. 288; *Goode, Bull. U.S. Nat. Mus.* no. 5, 1876, p. 59.
Enneacentrus punctulatus, *Poey, An. Soc. Esp.* iv. 1875, p. 94.
Epinephelus punctatus, *Jord. & Gilb. Syn. Fish. N. Am.* p. 541 (1882).
Bodianus punctatus, *Jord. & Gilb. l. c.* p. 919.
Epinephelus fulvus, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 402.
Bodianus fulvus, *Jord. & Eigenm. Bull. U.S. Fish. Comm.* viii. 1890, p. 379.

D. IX 14–16. A. III 9 (rarely 8). Sc. 90–110 $\frac{7-9}{32-35}$; l.l. 53–65.

Teeth forming rather narrow bands, in three series on the sides of the mandible; canines moderate. Depth of body nearly equal to length of head, $2\frac{3}{4}$ to 3 times in total length. Snout $1\frac{1}{3}$ to $1\frac{1}{2}$ diameter of eye, which is 5 to 6 times in length of head and equals interorbital width; lower jaw projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity $\frac{2}{3}$ to $\frac{1}{5}$ diameter of eye; præopercle very finely serrated, the serræ slightly enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower not extending so far back as upper; opercular flap obtusely pointed; head covered with cycloid scales; snout and maxillary entirely or partially scaly. Gill-rakers 17 or 18 on lower part of anterior arch, the longest at least as long as gill-fringes. Dorsal originating above base of pectoral; spines increasing in length to the third, which is about $\frac{1}{3}$ length of head, and considerably shorter than the longest soft rays; soft portion rounded. Pectoral about $\frac{3}{4}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, shorter than longest dorsal spines. Caudal truncate. Scales strongly ciliated. Yellow, red, or brown, with more or less numerous blue dots encircled with darker; usually a pair of black spots at the anterior extremity of the lower jaw; a pair of black spots on the back of the caudal peduncle, behind the dorsal fin; a black spot at the tip of the membrane between the dorsal spines, behind each spine.

Total length 280 millim.

Atlantic coasts of Tropical America, as far north as Florida Keys and the Bermudas.

| | | |
|---|---|---|
| *a.* Ad. | Bermuda. | J. M. Jones, Esq. [C.]. |
| *b–c.* Ad. | Jamaica. | Intern. Fisheries Exhib., 1883. |
| *d–i.* Ad. & hgr., skins. | Jamaica. | Parnell Collection. |
| *k.* Ad., skin. | St. Thomas. | |
| *l.* Ad. | St. Croix. | |
| *m.* Yg. | Dominica. | |
| *n–q.* Ad. | Barbados. | |
| *r–s.* Ad. | Pernambuco. | Capt. Milner [P.]. |
| *t.* Ad. | Bahia. | |
| *u, v.* Ad., skins. | Lord Howe Island (??). | J. Macgillivray, Esq. [C.]. |
| *w.* Skeleton. | | |

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## 11. Epinephelus rogaa.

Perca rogaa, *Forsk. Descr. Anim.* p. 38 (1775).
Perca lunaria, *Forsk. l. c.* p. 39.
Bodianus rogaa, *Bl. Schn. Syst.* p. 334 (1801).
Serranus rogaa, *Cuv. & Val.* ii. p. 349 (1828); *Rüpp. Atlas, Fische Roth. Meer.* p. 105, pl. xxvi. fig. 1 (1828); *Günth.* i. p. 116 (1859); *Playf. & Günth. Fish. Zanzib.* p. 2 (1866); *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 679, *and Fische Roth. Meer.* p. 3 (1884).
Serranus lunarius, *Rüpp. N. Wirbelth. Abyss., Fische Roth. Meer.* p. 90 (1835).

D. IX 17–18. A. III 9. Sc. 100–115 $\frac{11-13}{43-48}$; l. l. 52–55.

Teeth forming rather broad bands, in three or four series on the sides of the mandible; canines moderate. Depth of body $2\frac{1}{4}$ to $2\frac{2}{3}$ times in total length, length of head 3 to $3\frac{1}{2}$ times. Nape much elevated, humped in old specimens; upper profile of head more or less concave; snout longer than diameter of eye, which is 5 to 7 times in length of head, and nearly equal to interorbital width; lower jaw projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity equal to, or exceeding diameter of eye; præopercle very finely serrated, the serræ scarcely enlarged at the angle; middle opercular spine nearer lower than upper; opercular flap obtusely pointed, upper border sinuous; head entirely covered with cycloid scales. Gill-rakers 9, and some rudiments on lower part of anterior arch, the longest longer than gill-fringes. Dorsal originating above base of pectorals; spines increasing in length to the third, which is slightly longer than the following, $\frac{1}{4}$ to $\frac{1}{3}$ length of head, and $\frac{2}{3}$ to $\frac{1}{2}$ length of longest soft rays; soft portion angulate posteriorly. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head, asymmetrical, upper rays longest. Ventral as long as pectoral, reaching anus or beyond. Third anal spine a little longer than second, as long as fourth dorsal; soft anal rays as long as dorsals. Caudal truncate. Scales strongly ciliated. Dark brown or black; young with the dorsal tipped with white and a crescentic white border to the caudal.

Total length 550 millim.

Indian Ocean (Red Sea, Zanzibar, Mouth of the Persian Gulf, Ceylon).

| | | |
|---|---|---|
| *a*. Hgr., stffd. | Red Sea. | |
| *b*. Ad., stffd. | Zanzibar. | |
| *c*. Hgr., skin. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *d*. Hgr. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *e*. Ad., stffd. | Muscat. | A.S. G. Jayakar, Esq. [P.]. |
| *f*. Ad., skin. | Ceylon. | H. Nevill, Esq. [P.]. |

## 12. Epinephelus dubius.

Serranus dubius, *Poey, Mem. Cuba*, ii. p. 142 (1860).
Enneacentrus dubius, *Poey, Repert. Cuba*, ii. 1868, p. 289.
Menephorus dubius, *Poey, An. Soc. Esp.* iv. 1875, p. 95.

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Menephorus punctiferus, *Poey, l. c.*
Epinephelus dubius, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 405.
Bodianus dubius, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 380.

D. IX 17. A. III 9. Sc. circa 100.

Depth of body $2\frac{5}{6}$ times in total length, length of head $3\frac{1}{5}$ times. Snout as long as eye, which is $4\frac{1}{2}$ times in length of head; interorbital space narrow; lower jaw much projecting; maxillary extending to below posterior third of eye; præopercle finely serrate, rounded at the angle. Longest dorsal spine $\frac{1}{3}$ length of head. Pectoral nearly as long as head. Second anal spine scarcely longer than third, much shorter than soft rays. Caudal crescentically notched. Scales strongly ciliated. Bright red, dotted with blue; tips of caudal dark brown or black.

Total length 250 millim.

Cuba.

### 13. Epinephelus tæniops.

Serranus tæniops, *Cuv. & Val.* ii. p. 370 (1828); *Günth.* i. p. 121 (1859); *Trosch. Arch. f. Nat.* 1866, p. 195; *Steind. Denkschr. Ak. Wien*, xliv. 1881, p. 20, pl. i. fig. 1.
Bodianus tæniops, *Jord. & Gilb. Syn. Fish. N. Am.* p. 919 (1882); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 379.
Enneacentrus tæniops, *Jord. & Swain, Bull. U.S. Nat. Mus.* vii. 1884, p. 402.

D. IX 15. A. III 9 (rarely 10). Sc. 125–130 $\frac{10\text{–}12}{42\text{–}48}$; l. l. 75–82.

Teeth forming rather broad bands, in three or four series on the sides of the mandible; canines strong. Depth of body 3 to $3\frac{1}{5}$ times in total length, length of head $2\frac{4}{5}$ to 3 times. Snout $1\frac{1}{4}$ to $1\frac{1}{2}$ diameter of eye, which is contained 5 to 6 times in length of head; interorbital width 6 to 7 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity equal to or a little less than diameter of eye; præopercle very finely serrated, the serræ scarcely enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower not extending so far back as upper; opercular flap obtusely pointed, its upper border strongly curved; head covered with cycloid scales; snout and maxillary entirely or partially scaly. Gill-rakers 10 or 11, and 6 to 8 rudiments, on lower part of anterior arch, the longest longer than gill-fringes. Dorsal originating above base of pectoral; spines increasing in length to the third, which is about $\frac{1}{3}$ length of head and shorter than posterior soft rays; soft dorsal rounded. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral shorter, reaching anus or not quite so far. Second and third anal spines equal, as long as or a little shorter than longest dorsal spine, and much shorter than soft rays. Caudal rounded. Scales strongly ciliated. Dark brown,

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all over with small blue, black-edged spots; a blue horizontal streak below the eye; soft dorsal, anal, and caudal edged with blue.

Total length 320 millim.

West Coast of Tropical Africa. Stated by Steindachner to be found also on the coasts of the Bahamas and Florida.

| | | |
|---|---|---|
| *a.* Ad. | St. Vincent, Cape Verd. | Lords of the Admiralty [P.]. |
| *b–c.* Hgr. | Cape Verd Ids. | Rev. R. T. Lowe [P.]. |
| *d.* Ad., skin. | Cape Verd. | |
| *e.* Ad. | S. Africa (?). | |
| *f.* Ad. | Atlantic. | Haslar Collection. |
| *h.* Ad., skel. | Atlantic. | Haslar Collection. |

## 14. Epinephelus sonnerati.

? Labrus guaza, part., *Lacép. Poiss.* iii. p. 501, pl. xxvii. fig. 1 (1802).

Serranus sonnerati, *Cuv. & Val.* ii. p. 299 (1828); *Day, Fish. Ind.* p. 25, pl. vii. fig. 1 (1876), *and Faun. Ind., Fish.* i. p. 457, fig. (1889).

? Serranus zananella, *Cuv. & Val. t. c.* p. 304.

Serranus pachycentrum, part., *Günth.* i. p. 116 (1859).

Serranus erythræus (*non C. & V.*), *Playf. & Günth. Fish. Zanzib.* p. 2, pl. i. fig. 1 (1866).

Epinephelus janthinopterus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 40, *and Atlas Ichthyol.* vii. p. 36, pl. cccxxxii. fig. 5 (1876).

Serranus leopardus, part., *Günth. Fische Südsee*, p. 4 (1873).

D. IX 15. A. III 9. Sc. 110–140 $\frac{11-14}{43-52}$; l. l. 65–75.

Teeth forming rather broad bands, in three to five series on the sides of the mandible; canines moderate or strong. Depth of body $2\frac{2}{3}$ to 3 times in total length, length of head 3 to $3\frac{1}{2}$ times. Snout longer than diameter of eye, which is contained 5 to $6\frac{1}{2}$ times in length of head; interorbital width $5\frac{1}{3}$ to 8 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity nearly equalling, or exceeding diameter of eye; præopercle very finely serrated, the serræ scarcely enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap obtusely pointed, upper border strongly curved; head covered with cycloid scales, snout and maxillary entirely or partially naked. Gill-rakers 9 or 10, and 5 or 6 rudiments, on lower part of anterior arch, the longest about as long as gill-fringes. Dorsal originating above base of pectoral or axilla; spines increasing in length to the third, which is $\frac{1}{4}$ to $\frac{1}{3}$ length of head, and considerably shorter than posterior soft rays; soft dorsal rounded. Pectoral about $\frac{2}{3}$ length of head. Ventral a little shorter, usually not quite reaching anus. Second and third anal spines equal, as long as or a little shorter than longest dorsal spine, $\frac{1}{2}$ to $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales strongly ciliated. Red or reddish, with a more or less distinct

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bluish network on the head; body and fins with or without small whitish or bluish spots.

Total length 540 millim.

Indian and Western Pacific Oceans, from the Mascarenes, Zanzibar, and the Mouth of the Persian Gulf to the Caroline and Friendly Islands.

| | | |
|---|---|---|
| *a*. Yg. | Mauritius. | P. L. Sclater, Esq. [P.]. |
| *b*. Ad., stffd. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *c*. Ad. | Seychelles. | Sir Lambert Playfair [P.]. |
| *d*. Ad. | Seychelles. | Prof. E. P. Wright [C.]. |
| *e*. Ad., stffd. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *f*. Ad., skin. | Ceylon. | Zoological Society. |
| *g*. Ad., stffd. | Madras. | Secretary of State for India [P.]. |
| *h*, *i*. Ad. & hgr., stffd. | Madras. | Madras Museum. |
| *k*, *l*. Hgr., skins. | Madras. | F. Day, Esq. [P.]. |
| *m*. Hgr. | Pelew Ids. | Museum Godeffroy. |
| *n*. Hgr. | Kingsmill Ids. | Museum Godeffroy. |
| *o*. Ad. | Samoa. | Museum Godeffroy. |
| *p*. Ad., stffd. | Australia. | J. Gould, Esq. [P.]. |

### 15. Epinephelus nigripinnis.

Serranus nigripinnis, *Cuv. & Val.* ii. p. 339 (1828); *Bleek. Nat. Tijdschr. Nederl. Ind.* ix. 1855, p. 500; *Günth.* i. p. 118 (1859).

Epinephelus nigripinnis, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 39, *and Atl. Ichth.* vii. p. 36, pl. cclxxxiv. fig. 2 (1876); *Sauv. Hist. Madag., Poiss.* p. 55 (1891).

Serranus guttatus, part., *Day, Fish. Ind.* p. 24, pl. vi. fig. 3 (1875), *and Suppl.* p. 782 (1888), *and Faun. Ind., Fish.* i. p. 457 (1889).

D. IX 14–16. A. III 9. Sc. 125–130 $\frac{12-15}{40-50}$; l. l. 53–60.

Teeth forming broad bands, in four or five series on the sides of the mandible; canines moderate. Depth of body $2\frac{3}{4}$ to $3\frac{1}{5}$ times in total length, length of head $2\frac{3}{4}$ to $3\frac{1}{5}$ times. Snout longer than the eye, the diameter of which is 5 to 6 times in length of head; inter-orbital width 6 to 7 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity nearly equalling diameter of eye; præopercle very finely serrated, the serræ scarcely enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper; opercular flap obtusely pointed; head entirely covered with cycloid scales. Gill-rakers 9, and some rudiments, on lower part of anterior arch, the longest about as long as gill-fringes. Dorsal originating above base of pectoral; spines increasing in length to the third, which is $\frac{2}{7}$ to $\frac{1}{3}$ length of head, and hardly $\frac{2}{3}$ length of posterior longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral much shorter, not reaching anus. Second and third anal spines equal, as long as longest dorsal spines, and about $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales strongly ciliated. Dark brown, head and sometimes part of the body dotted with yellowish or

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bluish, the coloration sometimes resembling closely that of *E. hemistictus*; fins blackish, pectoral and caudal edged with yellow.

Total length 430 millim.

Indian and West Pacific Oceans, from the Mascarene Islands and the Mouth of the Persian Gulf to the coast of China and the North Coast of Australia.

| | | |
|---|---|---|
| *a*. Ad. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *b*. Ad., stffd. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |

*Serranus phaeton*, Cuv. & Val. ii. p. 309, pl. xxxiv. (1828), is, as shown by Vaillant, Bull. Soc. Philom. (2) x. 1873, p. 94, founded on a dry specimen from a Dutch collection made up of the head and body of an *Epinephelus* (probably the above species) and the tail of a *Fistularia*.

## 16. Epinephelus argus.

Bodianus guttatus, *Bloch, Ausl. Fische*, iv. p. 36, pl. ccxxiv. (1790).
Cephalopholis argus, *Bl. Schn. Syst.* p. 311 (1801).
Bodianus jacob-evertsen, part., *Lacép. Poiss.* iv. p. 296 (1802).
Serranus argus, *Cuv. & Val.* ii. p. 360 (1828); *Günth.* i. p. 115 (1859); *Peters, Mon. Berl. Ac.* 1865, p. 103.
Serranus luti (*non Forsk.*), *Cuv. & Val. t. c.* p. 363.
Serranus myriaster, *Cuv. & Val. t. c.* p. 365; *Rüpp. Atlas, Fisch. Roth. Meer.* p. 107, pl. xxvii. fig. 1 (1828); *Lesson, Voy. Coquille, Zool.* p. 234, pl. xxxvii. (1830); *Quoy & Gaim. Voy. Astrolabe, Poiss.* p. 653, pl. iii. fig. 1 (1833); *Richards. Rep. Ichth. China*, p. 233 (1846).
Serranus guttatus, *Günth.* i. p. 119 (1859); *Kner, Novara, Fische*, p. 22 (1865); *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 686; *Günth. Fische Südsee*, p. 5, pl. iv. (1873); *Macleay, Proc. Linn. Soc. N. S. W.* v. 1880, p. 315; *Klunz. Fische Roth. Meer.* p. 3 (1884).
Epinephelus guttatus, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 232.
Epinephelus argus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 57, *and Atl. Ichth.* vii. p. 43, pl. cccxlii. fig. 3 (1876); *Sauv. Hist. Madag., Poiss.* p. 54 (1891).
Serranus guttatus, part., *Day, Fish. Ind.* p. 24 (1875), *and Faun. Ind., Fish.* i. p. 457 (1889).
? Serranus perguttatus, *De Vis, Proc. Linn. Soc. N. S. W.* viii. 1883, p. 445.
Epinephelus miniatus, part., *Sauv. l. c.* p. 52.

D. IX 15–16. A. III 9. Sc. 95–110 $\frac{9-10}{32-38}$; l. l. 50–55.

Teeth forming broad bands, in four or five series on the side of the mandible; canines moderate or strong. Depth of body $2\frac{3}{4}$ to 3 times in total length, length of head $2\frac{3}{4}$ to $3\frac{1}{4}$ times. Snout $1\frac{1}{2}$ to twice as long as diameter of eye, which is 5 to 6 times in length of head; interorbital width 6 to 7 times in length of head; lower jaw strongly projecting; maxillary extending considerably beyond vertical of posterior border of eye, the width of its distal extremity equal to diameter of eye; præopercle very finely serrated, the serræ

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scarcely enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap pointed; head covered with cycloid scales, snout and maxillary entirely or partially scaly. Gill-rakers 8 or 9, and several rudiments, on lower part of anterior arch, the longest nearly as long as or shorter than gill-fringes. Dorsal originating above base of pectoral or axilla; spines increasing in length to the third or fourth, which is nearly $\frac{1}{3}$ length of head, and much shorter than posterior soft rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, nearly as long as longest dorsal spines, and much shorter than the soft rays. Caudal rounded. Scales strongly ciliated. Dark brown or black anteriorly, paler posteriorly, with vertical dark bars; head, body, and fins with small round blue spots encircled by black rings; spinous dorsal edged with yellow or orange; soft fins with a narrow light edge.

Total length 430 millim.

Indian and Western Pacific Oceans.

| | | |
|---|---|---|
| *a*. Ad., stffd. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *b*. Ad., stffd. | Zanzibar. | Sir B. Frere [P.]. |
| *c*. Yg. | Zanzibar. | Sir J. Kirk [P.]. |
| *d–f*. Ad. | Seychelles. | Prof. E. P. Wright [C.]. |
| *g*. Ad., stffd. | Mauritius. | |
| *h*. Ad., skin. | Ceylon. | Dr. Kelaart [P.]. |
| *i*. Hgr. | Port Blair, Andamans. | F. Day, Esq. [P.]. |
| *k*. Yg. | Borneo. | |
| *l*. Hgr. | Ceram. | |
| *m*. Yg. | Duke of York Island. | Rev. G. Brown [C.]. |
| *n–o*. Yg. | Savay. | Museum Godeffroy. |
| *p*. Ad., stffd. | Samoa. | Rev. S. J. Whitmee [P.]. |
| *q*. Ad. | ——? | Haslar Collection. |

### 17. Epinephelus hemistictus.

Serranus hemistictus, *Rüpp. Atlas, Fische Roth. Meer.* p. 109, pl. xxvii. fig. 3 (1828); *Günth.* i. p. 119 (1859); *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 680, *and Fische Roth. Meer.* p. 4 (1884).

Serranus luti, *Guichen. in Lefebvre, Voy. Abyss., Zool.* p. 231, *Poiss.* pl. v. fig. 2 (1845).

Serranus miniatus, var. hemistictus, *Kossm. & Räub. Ergebn. Reise Roth. Meer.* p. 6 (1877).

D. IX 14. A. III 9. Sc. 95–110 $\frac{7-9}{35-39}$; l. l. 50–55.

Teeth forming rather narrow bands, in two or three series on the sides of the mandible; canines moderate or strong. Depth of body equal to length of head, $2\frac{3}{4}$ to 3 times in total length. Snout longer than diameter of eye, which is 5 to $5\frac{1}{2}$ times in length of head; interorbital width 6 to 7 times in length of head; lower jaw strongly projecting; maxillary extending to below posterior border of eye, or beyond, the width of its distal extremity nearly equal

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to diameter of eye; præopercle very finely serrated, the serræ scarcely enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap obtusely pointed; head covered with cycloid scales; snout and maxillary entirely or partially scaly. Gill-rakers 9 or 10, and some rudiments, on lower part of anterior arch, the longest nearly as long as gill-fringes. Dorsal spines increasing in length to the third or fourth, which is nearly $\frac{1}{3}$ length of head, and considerably shorter than posterior soft rays; soft dorsal angulate. Pectoral $\frac{3}{4}$ to $\frac{4}{5}$ length of head. Ventral shorter, reaching anus. Second and third anal spines equal, a little longer than longest dorsal spines and considerably shorter than soft rays. Caudal rounded. Scales strongly ciliated. Dark brown; head and lower half of body with blue dots encircled with black; pectoral blackish, broadly edged with yellow; soft dorsal, anal, and caudal blackish, dotted with blue, with a narrow white edge.

Total length 200 millim.

Red Sea, South Coast of Arabia, coast of Zanzibar.

| | | | |
|---|---|---|---|
| *a*. | Ad. | Red Sea. | Rüppell Collection. |
| *b*. | Ad., stffd. | Red Sea. | |
| *c*. | Many specimens. | Massowah. | Marquis G. Doria [P.]. |
| *d*. | Ad., skin. | Zanzibar. | Sir Lambert Playfair [C.]. |

### 18. Epinephelus miniatus.

Perca miniata, *Forsk. Descr. Anim.* p. 41 (1775).
Pomacentrus burdi, *Lacép. Poiss.* iv. p. 511 (1802).
Diacope miniata, *Cuv. & Val.* ii. p. 433 (1828).
Serranus miniatus, *Rüpp. Atlas, Fische Roth. Meer.* p. 10, pl. xxvi. fig. 3 (1828); *Günth.* i. p. 118 (1859); *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 679; *Günth. Fische Südsee*, p. 5, pl. v. (1873); *Day, Fish. Ind.* p. 24, pl. vi. fig. 2 (1875); *Klunz. Fische Roth. Meer.* p. 4 (1884); *Day, Faun. Ind., Fish.* i. p. 456 (1889).
Serranus cyanostigma (*non C. & V.*), *Val., Cuv. R. A., Ed. Illustr.* pl. viii. fig. 2 (1836).
Serranus cyanostigmatoides, *Bleek. Verh. Batav. Gen.* xxii. 1849, p. 31; *Günth.* i. p. 117.
Epinephelus cyanostigmatoides, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 232.
Epinephelus miniatus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 53, *and Atl. Ichth.* vii. p. 41, pl. cclxxxiii. fig. 3 (1876).
Epinephelus miniatus, part., *Sauv. Hist. Madag., Poiss.* p. 52 (1891).

D. IX 15–16. A. III 9. Sc. 105–115 $\frac{8-10}{40-45}$; l. l. 50–60.

Teeth forming rather narrow bands, in two or three series on the sides of the mandible; canines moderate or strong. Depth of body $2\frac{3}{4}$ to 3 times in total length, length of head $2\frac{3}{4}$ to $3\frac{1}{4}$ times. Snout longer than diameter of eye, which is 5 to 6 times in length of head; interorbital width 6 to 7 times in length of head; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity nearly equal to diameter of eye; præopercle

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very finely serrated, the serræ scarcely enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap obtusely pointed, the upper border strongly curved; head covered with cycloid scales; snout and maxillary entirely or partially scaly. Gill-rakers 9 or 10, and several rudiments, on lower part of anterior arch, the longest longer than gill-fringes. Dorsal originating above base of pectoral; spines increasing in length to the third, which is nearly $\frac{1}{3}$ length of head, and considerably shorter than posterior soft rays. Pectoral $\frac{5}{7}$ or $\frac{3}{4}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, as long as or a little longer than longest dorsal spine, considerably shorter than soft rays. Caudal rounded. Scales strongly ciliated. Red or pinkish, with rather large blue spots encircled by dark rings; these spots few or absent on the pectorals and ventrals.

Total length 410 millim.

Indian and Western South Pacific Oceans.

| | | |
|---|---|---|
| *a*. Ad. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *b*. Ad., skin. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *c*. Yg. | Zanzibar. | Sir J. Kirk [P.]. |
| *d*. Ad. | Mauritius. | P. L. Sclater, Esq. [P.]. |
| *e*. Ad., skin. | Ceylon. | H. Nevill, Esq. [P.]. |
| *f*. Ad., skin. | Madras. | F. Day, Esq. [P.]. |
| *g*. Ad. | Port Blair, Andamans. | F. Day, Esq. [P.]. |
| *h*. Ad. | N. Celebes. | Dr. A. B. Meyer [C.]. |
| *i*, *k*. Hgr. & yg. | Amboyna. | |
| *l*. Ad. | Apamana. | Museum Godeffroy. |
| *m*. Ad. | Samoa. | Museum Godeffroy. |

### 19. Epinephelus urodelus.

Bodianus miniatus, part., *Bl. Schn. Syst.* p. 333 (1801).

Serranus urodelus, *Cuv. & Val.* ii. p. 306 (1828); *Bleek. Nat. Tijdschr. Nederl. Ind.* vii. 1854, p. 39; *Günth.* i. p. 122 (1859), *and Fische Südsee*, p. 3, pl. iii. fig. A (1873).

Serranus erythræus, *Cuv. & Val.* vi. p. 516 (1830); *Günth.* i. p. 116.

Perca urodela, *Forst. Descr. Anim.* p. 221 (1844).

Serranus sonnerati, part., *Günth.* i. p. 122.

Epinephelus urodelus, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 232, *and Atl. Ichth.* vii. p. 41, pl. cccxxi. fig. 2 (1876).

Serranus sonnerati, *Playf. & Günth. Fish. Zanzib.* p. 3, pl. iii. fig. 1 (1866).

Epinephelus miltostigma, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 43, *and Atl. Ichth.* vii. p. 37, pl. cccxxx. fig. 5.

Epinephelus playfairi, *Bleek. Verh. Akad. Amst.* xviii. no. 3, 1879, p. 2.

Epinephelus erythræus, *Sauv. Hist. Madag., Poiss.* p. 57, pl. x. fig. 1 (1891).

D. IX 14–16. A. III 9. Sc. 95–115 $\frac{8-10}{35-40}$; l. l. 55–70.

Teeth forming rather broad bands, in three to five series on the sides of the mandible; canines moderate. Depth of body equal to

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length of head, $2\frac{3}{4}$ to 3 times in total length. Snout longer than diameter of eye, which is $4\frac{1}{2}$ to $5\frac{1}{2}$ times in length of head; interorbital width 5 to 6 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity equal to or a little less than diameter of eye; præopercle very finely serrated, the serræ scarcely enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap pointed; head covered with cycloid scales; snout and maxillary entirely or partially scaly. Gill-rakers 9 or 10, and several rudiments, on lower part of anterior arch, the longest as long as or a little longer than gill-fringes. Dorsal originating above base of pectoral; spines increasing in length to the fourth or fifth, which is about $\frac{1}{3}$ length of head, and considerably shorter than posterior soft rays; outline of soft dorsal obtusely angular behind. Pectoral about $\frac{3}{4}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, nearly as long as longest dorsal spines and shorter than longest soft rays. Caudal rounded. Scales strongly ciliated. Red or brownish red, uniform or with vermilion or bluish-white dots; pectoral and vertical fins usually dark.

Total length 240 millim.

Indian Ocean (Mauritius, Seychelles, Zanzibar, Malay Archipelago) and Polynesia.

A. Two oblique white bands on the caudal, converging behind. (*E. urodelus.*)

| | | |
|---|---|---|
| *a.* Ad. | Mysol. | |
| *b.* Ad. | Amboyna. | |
| *c–d.* Ad. | Solomon Islands. | G. Krefft, Esq. [P.]. |
| *e.* Ad., skin. | Aneiteum, New Hebrides. | |
| *f–g.* Ad. | Micronesia. | |

B. No white bands on the caudal. (*E. erythræus.*)

| | | |
|---|---|---|
| *h–i.* Hgr. & yg. | Mauritius. | P. L. Sclater, Esq. [P.]. |
| *k.* Ad., skin. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *l.* Hgr. | Seychelles. | Sir Lambert Playfair [P.]. |
| *m.* Ad. | Sumatra. | |
| *n.* Ad. | —— ? | |

## 20. Epinephelus aurantius.

Serranus aurantius, *Cuv. & Val.* ii. p. 305* (1828); *Bleek. Nat. Tijdschr. Nederl. Ind.* iii. 1852, p. 571; *Günth.* i. p. 118 (1859).

? Serranus roseus, *Cuv. & Val. t. c.* p. 306.

Serranus analis, *Cuv. & Val. t. c.* p. 307†, and vi. p. 514 (1830); *Less. Voy. Coquille, Zool.* ii. p. 235 (1830); *Günth. t. c.* p. 123.

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* Type (Paris Mus., no. 765) examined.

† Type (Paris Mus., no. 7269) examined.



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Serranus rufus, *Hombr. & Jacq. Voy. Pôle Sud, Zool.* iii. *Poiss.* p. 85, pl. 1 bis. fig. 4 (1853).
Serranus sonnerati, part., *Günth. t. c.* p. 122.
Epinephelus aurantius, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 232, *and Atl. Ichth.* vii. p. 37, pl. ccxcviii. fig. 3 (1876); *Sauv. Hist. Madag., Poiss.* p. 60, pl. ix. fig. 5 (1891).
Epinephelus analis, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 45, *and Atl.* p. 38, pl. cccxxix. fig. 5.
Serranus leopardus, part., *Günth. Fische Südsee*, p. 4 (1873).

D. IX 14–15. A. III 9 (rarely 8). Sc. 90–105 $\frac{8-10}{32-40}$; l. l. 51–55.

Teeth forming rather broad bands, in three or four series on the sides of the mandible; canines moderate. Depth of body $2\frac{3}{4}$ to 3 times in total length, length of head $2\frac{2}{3}$ to 3 times. Snout a little longer than diameter of eye, which is contained $4\frac{1}{2}$ to 6 times in length of head; interorbital width 6 to 7 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity $\frac{3}{4}$ diameter of eye; præopercle very finely serrated, the serræ scarcely enlarged at the angle, which is rounded; middle opercular spine slightly nearer lower than upper, lower not further back than upper; opercular flap pointed; head covered with cycloid scales, snout and maxillary naked, or with very small scales. Gill-rakers 10 to 12, and some rudiments, on lower part of anterior arch, the longest about as long as gill-fringes. Dorsal originating above base of pectoral; spines increasing in length to the third, which is about $\frac{1}{3}$ length of head, and shorter than posterior soft rays. Pectoral $\frac{1}{3}$ length of head. Ventrals much shorter, reaching anus or not so far. Second anal spine slightly longer than third, nearly as long as longest soft rays, longer than longest dorsal spine, and about $\frac{2}{3}$ length of head. Caudal rounded. Scales strongly ciliated. Orange or pink, with or without blue dots on the head and anterior part of the back; vertical fins sometimes with a dark edge.

Total length 175 millim.; reaches to 300.

Indian and Western Pacific Oceans, from the Seychelles and Mascarenes to New Ireland and the Louisiade Archipelago.

| | | |
|---|---|---|
| *a*. Hgr. | N. Celebes. | Dr. A. B. Meyer [C.]. |
| *b*. Hgr., skin. | Louisiade Archipelago. | J. Macgillivray, Esq. [C.]. |

### 21. Epinephelus sexmaculatus.

Serranus sexmaculatus, *Rüpp. Atlas, Fische Roth. Meer.* p. 107 (1828); *Günth.* i. p. 118 (1859), *and Fische Südsee*, p. 3, pl. ii. (1873); *Klunz. Fische Roth. Meer.* p. 4 (1884).
Serranus miniatus, var. sexmaculata, *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 12.

D. IX 15. A. III 9. Sc. 100–105 $\frac{7-9}{35-43}$; l. l. 50–55.

Teeth forming rather broad bands, in three or four series on the sides of the mandible; canines strong. Depth of body $2\frac{1}{2}$ to $2\frac{2}{3}$ times in total length, length of head $2\frac{2}{3}$ to 3 times. Snout longer

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than diameter of eye, which is 5½ to 6 times in length of head; interorbital width 6 to 6½ times in length of head; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye, the width of its distal extremity equal to or a little less than diameter of eye; præopercle very finely serrated, the serræ scarcely enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap obtusely pointed, the upper border very convex; head covered with cycloid scales; snout and maxillary entirely or partially scaly. Gill-rakers longer than gill-fringes, 15 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the third or fourth, which is about ⅓ length of head and considerably shorter than posterior soft rays; soft dorsal rounded. Pectoral ¾ to ⅘ length of head. Ventral considerably shorter, reaching anus or not quite so far. Second and third anal spines nearly equal, about as long as longest dorsal spines, and much shorter than longest soft rays. Caudal rounded. Scales strongly ciliated. Red, dotted nearly all over with blue; in addition to the spots, blue lines may be present on the head; four large black spots on back at base of dorsal and two behind dorsal.

Total length 375 millim.

Indian and Western Pacific Oceans, from the Red Sea, Zanzibar, and the Mascarene Islands to the Society Islands.

| | | |
|---|---|---|
| *a*. Ad. | Red Sea. | Dr. Klunzinger [P.]. |
| *b*. Ad., stffd. | Zanzibar. | Sir B. Frere [P.]. |
| *c*. Hgr., skin. | Mauritius. | |
| *d*. Ad. | Tahiti. | Museum Godeffroy. |

### 22. Epinephelus leopardus.

Labrus leopardus, *Lacép. Poiss.* iii. p. 517, pl. xxx. fig. 1 (1802).
Serranus leopardus, *Cuv. & Val.* ii. p. 336 (1828); *Günth.* i. p. 123 (1859); *Day, Fish. Ind.* p. 25, pl. vi. fig. 4 (1875), *and Faun. Ind., Fish.* i. p. 457 (1889).
Serranus zanana, *Cuv. & Val. t. c.* p. 339; *Günth. t. c.* p. 123.
Serranus spilurus, *Cuv. & Val.* ix. p. 433 (1833); *Bleek. Nat. Tijdschr. Nederl. Ind.* vi. 1853, p. 322.
Epinephelus spilurus, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 232.
Serranus homfrayi, *Day, Proc. Zool. Soc.* 1870, p. 678.
Epinephelus leopardus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 61, *and Atl. Ichth.* vii. p. 44, pl. cclxxxviii. fig. 2 (1876); *Sauv. Hist. Madag., Poiss.* p. 57, pl. x. fig. 1 (1889).
Serranus leopardus, part., *Günth. Fische Südsee*, p. 4, pl. iii. fig. B (1873).

D. IX 14. A. III 9. Sc. 80–90 $\frac{5\text{-}7}{28\text{-}30}$; l. l. 46–53.

Teeth forming rather broad bands, in three to five series on the sides of the mandible; canines moderate. Depth of body 2½ to 2¾ times in total length, length of head 2⅔ to 2¾ times. Snout a little longer than diameter of eye, which is 4 to 5½ times in length



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of head; interorbital width 5½ to 6 times in length of head; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye, the width of its distal extremity equal to or a little less than diameter of eye; præopercle very finely serrated, the serræ scarcely enlarged at the angle, which is rounded; middle opercular spine nearer lower than upper, lower a little further back than upper; opercular flap obtusely pointed; head covered with cycloid scales; snout and maxillary entirely or partially scaly. Gill-rakers short, shorter than gill-fringes, 16 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the fourth or fifth, which is about ⅓ length of head and considerably shorter than posterior soft rays; outline of soft dorsal obtusely angular behind. Pectoral ⅔ length of head. Ventral much shorter, not reaching anus. Second anal spine longer than third, a little longer than longest dorsal spines, and shorter than longest soft rays. Caudal rounded. Scales ciliated. Yellowish or olive, spotted with red; a more or less distinct dark stripe on the temple; one or two black spots on the back of the tail, behind the dorsal; caudal with two oblique dark bars, converging posteriorly or united into a crescentic band.

Total length 195 millim.

Indian and Western Pacific Oceans, from the Mascarene Islands to the coast of China and the Friendly Islands.

| | | |
|---|---|---|
| *a*. Yg. | Amboyna. | |
| *b*. Hgr., skin. | Louisiade Archipelago. | J. Macgillivray, Esq. [C.]. |
| *c*. Ad. | Tahiti. | Museum Godeffroy. |

### 23. Epinephelus acanthistius.

Bodianus acanthistius, *Gilb. Proc. U.S. Nat. Mus.* xiv. 1891, p. 552.

D. IX 17. A. III 9. Sc. 75; l. l. 56.

Teeth in two series on the sides of the mandible; canines well developed. Depth of body 2⅔ times in total length, length of head 2⅔ times. Snout as long as diameter of eye, which is 5 times in length of head; interorbital width 6 times in length of head; lower jaw strongly projecting; maxillary extending to below posterior third of eye; præopercular border rounded, minutely serrated, coarsely toothed at the angle; head covered with cycloid scales; maxillary naked. Gill-rakers long and strong, 17 on lower part of anterior arch. Third dorsal spine longest, half length of head, fourth, fifth, and sixth shorter, seventh, eighth, and ninth again lengthened; soft dorsal pointed. Pectoral long, ventral shorter. Soft portion of anal pointed. Caudal rounded. Scales cycloid. Uniform red (?), with a black streak on cheek, following hinder edge of maxillary; fins all blackish on distal half.

Total length 400 millim.

Cape Lobos, Gulf of California.

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IV. EPINEPHELUS, Bl.—Dorsal with 11 (rarely 10 or 12) spines; anal with 8 or 9 soft rays. Frontal bones with anterior excavation or emargination for the reception of the posterior processes of the præmaxillaries, and with a process or knob on each side behind the interorbital area; supraoccipital crest often produced forwards on the frontals; parietal crests not produced forwards.

Fig. 17.—Upper view of cranium of *Epinephelus areolatus*.

### 24. Epinephelus spiniger. (PLATE IV. fig. B.)

Serranus spiniger, *Günth.* i. p. 146 (1859).

D. XI 16. A. III 8. Sc. $125\frac{14}{47}$; l. l. 70.

Teeth in narrow bands, in two series on the sides of the mandible; canines strong. Depth of body nearly equal to length of head, 3 times in total length; snout slightly longer than diameter of eye, which is 5 times in length of head; interorbital width 6 times in length of head; lower jaw projecting; maxillary extending a little beyond vertical of posterior border of eye, the width of its posterior extremity $\frac{2}{3}$ diameter of eye; præopercle rounded, the serræ slightly enlarged at the angle; opercular spines equidistant, lower further back than upper; opercular flap pointed; head covered with cycloid scales; a patch of small scales on maxillary. Gill-rakers moderately elongate, about as long as gill-fringes, 12 on lower part of anterior arch. Dorsal originating above base of pectoral; second spine very long, half as long as head, nearly twice as long as third, which is a little longer than longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral a little shorter, not reaching anus. Second anal spine as long as third, nearly $\frac{1}{3}$ length of head, $\frac{2}{3}$ length of longest soft rays.

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Caudal truncate. Scales ciliated. Brownish (specimen discoloured), fins yellowish.

Total length 260 millim.

Habitat unknown.

*a*. Ad. (?) —— ? (Type.)

### 25. Epinephelus flavocæruleus. (Plate IV. fig. A.)

Holocentrus flavocæruleus, *Lacép. Poiss.* iv. p. 367 (1802).
Holocentrus gymnosus, *Lacép. t. c.* p. 372, & iii. pl. xxvii. fig. 2.
Bodianus macrocephalus, *Lacép. tt. cc.* p. 293, pl. xx. fig. 2.
Serranus borbonicus, *Quoy & Gaim. Voy. autour du Monde, Zool.* p. 312, pl. lvii. fig. 2 (1824).
Serranus flavocæruleus, *Cuv. & Val.* ii. p. 297 (1828); *Günth.* i. p. 145 (1859); *Playf. & Günth. Fish. Zanz.* p. 10 (1866); *Day, Fish. Ind.* p. 15, pl. iii. fig. 1 (1875), *and Faun. Ind., Fish.* i. p. 448 (1889).
Perca flavopurpurea, *Bennett, Fish. Ceylon*, pl. xix. (1841).
Serranus hoedtii, *Bleek. Nat. Tijdschr. Nederl. Ind.* viii. 1855, p. 406; *Günth.* i. p. 139, *and Fische Südsee*, p. 9, pl. viii. fig. A (1873).
Serranus punctatissimus, *Günth.* i. p. 144.
Epinephelus hoedtii, *Bleek. Nederl. Tijdschr. Dierk.* ii. 1865, p. 277, *and Atl. Ichth.* vii. p. 45, pl. cclxxxiii. fig. 2 (1876).
Epinephelus flavocæruleus, *Bleek. in Pollen & Van Dam, Faune Madag.* iv. p. 17 (1874); *Sauvage, Hist. Madag., Poiss.* p. 62 (1891).
Epinephelus flavocæruleus, *vars.* melanometopon *and* xanthometopon, *Bleek. l. c.*

D. XI 15–17. A. III 8. Sc. 130–150 $\frac{20-25}{55-65}$; l. l. 65–75.

Teeth in narrow bands, in two series on the sides of the mandible; canines small. Depth of body $2\frac{1}{2}$ to $2\frac{4}{5}$ times in total length, length of head $2\frac{3}{5}$ to 3 times. Snout as long as or a little longer than diameter of eye, which is 4 to 5 times in length of head and nearly equals interorbital width; lower jaw feebly projecting; maxillary extending to below centre or posterior border of eye, the width of its distal extremity $\frac{3}{5}$ to $\frac{3}{4}$ diameter of eye; præopercle with obtuse or feebly produced angle, which is armed with moderately enlarged serræ; middle opercular spine nearer lower than upper, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers nearly as long as gill-fringes, 16 to 18 on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, $\frac{2}{3}$ to $\frac{1}{2}$ length of head, as long as or longer than longest soft rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral nearly as long or a little shorter, reaching anus or not quite so far. Second anal spine a little shorter than third, $\frac{1}{3}$ to $\frac{2}{7}$ length of head, $\frac{1}{2}$ to $\frac{2}{3}$ length of longest soft rays. Caudal truncate or slightly emarginate. Scales mostly ciliated. Head and body pale lilac to dark purplish-blue, pectoral fins uniform yellow.

Total length 460 millim.

Indian and West Pacific Oceans.

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A. Dark purplish-blue, caudal peduncle and fins bright yellow. (*E. flavocæruleus.*)

*a.* Fins uniform or the tips of the ventrals and the outer ends of the caudals black.

| | | |
|---|---|---|
| *a, b.* Ad. & hgr. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *c.* Hgr., skin. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *d.* Yg. | Mauritius. | Zoological Society. |
| *e.* Hgr., skin. | Ceylon. | Dr. Kelaart [P.]. |
| *f.* Ad., skin. | Ceylon. | H. Nevill, Esq. [P.]. |
| *g.* Ad., stffd. | Madras. | Secretary of State for India [P.]. |

*b.* Soft dorsal, anal, caudal, and ventrals black-edged (var. *melanometopon*).

| | | |
|---|---|---|
| *h.* Ad., skin. | Ceylon. | H. Nevill, Esq. [P.]. |

B. Uniform purple; soft dorsal and anal with a yellow border; caudal fin yellow, with the outer ends black.

| | | |
|---|---|---|
| *a.* Ad. | Rodriguez. | G. Gulliver, Esq. [P.]. |
| *b.* Ad., skin. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *c.* Ad., stffd. | Mauritius. | |

C. Pale lilac to purple, head and body dotted all over with black. (*E. hoedtii.*)

*a.* Fins more or less distinctly black-dotted; soft dorsal, anal, and caudal black-edged with a yellow margin.

| | | |
|---|---|---|
| *a.* Yg. | China. | J. R. Reeves, Esq. (Type of *S. punctatissimus.*) |

*b.* Fins black-dotted, not black-edged.

| | | |
|---|---|---|
| *b.* Yg. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *c.* Hgr. | Formosa. | R. Swinhoe, Esq. [C.]. |
| *d.* Ad. | Mortlock. | Museum Godeffroy. |
| *e.* Yg. | Micronesia. | Mr. Wright [C.]. |

*c.* Soft dorsal, anal, and caudal fins uniform yellow.

| | | |
|---|---|---|
| *f.* Yg. | Ponape. | Museum Godeffroy. |

## 26. Epinephelus undulosus.

Bodianus undulosus, *Quoy & Gaim. Voy. autour du Monde, Zool.* p. 310 (1824).

Serranus lineatus, *Cuv. & Val.* ii. p. 312 (1828); *Günth.* i. p. 156 (1859); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 69 (1874).

Serranus amboinensis, *Bleek. Nat. Tijdschr. Nederl. Ind.* iii. 1852, p. 258; *Günth. l. c.*

Epinephelus amboinensis, *Bleek. Nederl. Tijdschr. Dierk.* ii. 1865, p. 277.

Epinephelus undulosus, *Bleek. Verh. Ak. Amst.* xiv. no. 2, 1873, p. 65, *and Atl. Ichth.* vii. p. 46, pl. cclxxxviii. fig. 3 (1876).

Serranus undulosus, *Day, Fish. Ind.* p. 13, pl. ii. fig. 1 (1875), *and Faun. Ind., Fish.* i. p. 446 (1889).

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D. XI 18–19 (rarely 17). A. III 8. Sc. 120–130 $\frac{18-20}{53-55}$; l. l. 65–70.

Teeth in narrow bands, in two series on the sides of the mandible; canines small. Depth of body 3 to 3¼ times in total length, length of head 3 times. Snout a little longer than the diameter of the eye, which is 4 to 5 times in the length of the head, and nearly equal to interorbital width; lower jaw projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity ⅔ to ¾ diameter of eye; præopercle more or less produced at the angle, which is armed with 2 to 5 strong teeth; opercular spines nearly equidistant, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers long and slender, longer than gill-fringes, 22 to 24 on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, ⅓ to ⅖ length of head, as long as or longer than longest soft rays. Pectoral ⅔ to ¾ length of head. Ventral as long as pectoral, reaching anus. Second anal spine a little shorter than third, ⅓ to ¼ length of head, ½ to ⅔ length of longest soft rays. Caudal truncate or slightly emarginate. Scales mostly ciliated. Pale olive or reddish-brown, with 6 to 12 somewhat sinuous bluish or dark brown longitudinal lines on the body; membrane between dorsal spines blackish on the edge; ventrals dark brown at the end.

Total length 360 millim.

Coasts of India, China, and the Malay Archipelago.

| | | |
|---|---|---|
| *a*. Ad., skin. | Ceylon. | Dr. Kelaart [P.]. |
| *b*. Hgr. | Madras. | F. Day, Esq. [P.]. |
| *c*. Yg. | China. | Sir J. Richardson [P.]. |
| *d*. Yg. | Mysol. | |

### 27. Epinephelus alexandrinus.

? Sparus scirenga, *Rafin. Caratt. N. Gen.* p. 50 (1810).

Serranus alexandrinus, *Cuv. & Val.* ii. p. 281 (1828); *Steind. Sitzb. Ak. Wien*, lvi. i. 1867, p. 615; *Vincig. Ann. Mus. Genova*, xviii. 1883, p. 492.

Plectropoma fasciatus, *Costa, Faun. Nap., Pesc.* pl. vi. (1850); *Canestr. Faun. Ital., Pesci*, p. 77 (1874).

Serranus costæ, *Steind. Sitzb. Ak. Wien*, lxxvii. i. 1878, p. 389.

Cerna fasciata, *Doderl. Bull. Soc. Sc. Nat. Palermo*, 1881, no. 15, p. 1.

Cerna alexandrina, *Doderl. l. c.* p. 3, *and Giorn. Sc. Palermo*, xv. 1882, p. 221, pl. iv. fig. 9.

Cerna costæ, *Doderl. l. c.* p. 214, pl. iii. fig. 7.

Serranus acutirostris (*non C. & V.*), *Perugia, Elenco Pesc. Adriat.* p. 3, pl. i. (1881).

Epinephelus alexandrinus, *Doderl. Man. Ittiol. Medit.* iv. p. 71 (1889); *Jord. & Eigenm. Bull. U.S. Fish. Comm.* viii. 1890, p. 358.

Epinephelus costæ, *Bellotti, Atti Soc. Ital. Sc. Nat.* xxxiii. 1891, p. 119.

D. XI 16–18. A. III 8. Sc. 120–145 $\frac{18-20}{42-48}$; l. l. 73–80.

Teeth in narrow bands, in two series on the sides of the man-

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dible; canines small. Depth of body $3\frac{1}{4}$ to $3\frac{1}{3}$ times in total length, length of head $2\frac{3}{4}$ to 3 times. Snout pointed, much longer than the diameter of the eye, which is $4\frac{1}{2}$ to $5\frac{1}{2}$ times in the length of the head, and nearly equals interorbital width; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{3}{5}$ diameter of eye; præopercular border angular, slightly produced at the angle, which is armed with 2 or 3 rather strong spines; opercular spines equidistant; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary naked, or with a band of small scales. Gill-rakers 16 or 17 on lower part of anterior arch, the longest at least as long as gill-fringes. Dorsal originating above base of pectoral; third or fourth spine longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, and about as long as longest soft rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral a little shorter, reaching anus or not quite so far. Second anal spine as long as or slightly shorter than third, $\frac{1}{4}$ length of head, $\frac{1}{3}$ to $\frac{2}{5}$ length of longest soft rays. Caudal truncate or slightly emarginate. Scales mostly ciliated. Brown, uniform or with four or five darker longitudinal lines; one or two more or less distinct oblique dark lines on each side of the head.

Total length 320 millim.

Mediterranean and neighbouring coasts of the Atlantic, as far south as the Cape Verd Islands.

| | | |
|---|---|---|
| *a.* Hgr. | Mediterranean coast of Egypt. | Consul Petherick [C.]. |
| *b–c.* Ad. | Cape Verd Islands. | Rev. R. T. Lowe [P.]. |

### 28. Epinephelus chrysotænia.

Cerna chrysotænia, *Doderl. Giorn. Sc. Palermo*, xv. 1882, p. 208, pl. ii. fig. 4.

Serranus chrysotænia, *Kolombat. Agg. Vert. Dalm., Pesc.* p. 23 (1884).

Epinephelus chrysotænia, *Doderl. Man. Ittiol. Medit.* iv. p. 69 (1889).

D. XI 16–17. A. III 8–9. Sc. $100\frac{15}{50}$.

Teeth in narrow bands, in two series on the sides of the mandible; canines rather small. Depth of body $3\frac{1}{4}$ times in total length, length of head 3 times. Snout pointed, nearly twice as long as diameter of eye, which is 7 times in length of head and $\frac{2}{3}$ interorbital width; lower jaw projecting; maxillary extending to below posterior border of eye; præopercle rounded, with slightly enlarged serræ at the angle; opercular spines equidistant; opercular flap pointed; head entirely covered with cycloid scales, maxillary included. Gill-rakers about 20 on lower part of anterior arch, the longest much longer than gill-fringes. Fifth dorsal spine longest, nearly $\frac{1}{4}$ length of head, as long as the soft rays. Second anal spine shorter than third. Caudal emarginate. Scales finely ciliated. Brown; a large, elongate golden blotch on each side, including the lateral line, from its origin to below the middle of the soft dorsal.

Total length 730 millim.

Mediterranean (coasts of Sicily and Dalmatia).

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### 29. Epinephelus areolatus.

Perca areolata, *Forsk. Descr. Anim.* p. 42 (1775).
Bodianus melanurus, *Geoffr. Descr. Egypte, Poiss.* p. 317, pl. xxi. fig. 1 * (1809).
Serranus melanurus, *I. Geoffr. l. c.* p. 319; *Cuv. & Val.* ii. p. 351 (1828); *Günth.* i. p. 147 (1859).
Serranus angularis, *Cuv. & Val. t. c.* p. 353; *Day, Fish. Ind.* p. 22, pl. v. fig. 2 (1875); *Steind. & Döderl. Denkschr. Ak. Wien,* xlvii. 1883, p. 232; *Day, Faun. Ind., Fish.* i. p. 454 (1889).
Serranus celebicus, *Bleek. Nat. Tijdschr. Nederl. Ind.* ii. 1851, p. 217; *Günth.* i. p. 139; *Klunz. Verh. zool.-bot. Ges. Wien,* xx. 1870, p. 676.
Epinephelus celebicus, *Bleek. Nederl. Tijdschr. Dierk.* ii. 1865, p. 277, *and Verh. Ak. Amst.* xiv. no. 2, 1873, p. 69.
Serranus glaucus, *Day, Proc. Zool. Soc.* 1870, p. 678.
Epinephelus angularis, *Bleek. Atl. Ichth.* vii. p. 48, pl. cclxxxix. fig. 3 (1876); *Sauv. Hist. Madag., Poiss.* p. 71 (1891).
Serranus areolatus, *Klunz. Fische Roth. Meer.* p. 3, pl. i. fig. 1 (1884).

D. XI 15–16 (rarely 17). A. III 8. Sc. 110–125 $\frac{12-15}{43-50}$; l. l. 50–57.

Teeth in narrow bands, in two series on the sides of the mandible; canines small. Depth of body 3 to $3\frac{1}{3}$ times in total length, length of head $2\frac{4}{5}$ to 3 times. Snout as long as or a little longer than diameter of eye, which is 4 to 5 times in length of head; interorbital width $5\frac{1}{2}$ to $6\frac{1}{4}$ times in length of head; lower jaw projecting; maxillary extending to below centre or posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præopercle more or less produced at the angle, which is armed with 3 to 7 enlarged spines; opercular spines nearly equidistant, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers at least as long as gill-fringes, 14 to 16 on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, $\frac{2}{5}$ to $\frac{1}{2}$ length of head, longer than longest soft rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral a little shorter, not reaching anus. Second anal spine as long as third, $\frac{1}{4}$ to $\frac{1}{3}$ length of head, $\frac{3}{5}$ to $\frac{2}{3}$ length of longest soft rays. Caudal emarginate. Scales mostly ciliated. Greyish, with numerous large yellow or reddish (dark brown in spirit) spots on the body and fins; soft dorsal, anal, and caudal with a blackish margin edged with yellow.

Total length 380 millim.

Indian Ocean; coast of Japan.

| | | |
|---|---|---|
| *a.* Yg. | Red Sea. | Rüppell Coll. |
| *b.* Yg. | Aden. | Capt. Shopland [P.]. |
| *c–g.* Ad. & hgr. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *h.* Hgr. | Andamans. | F. Day, Esq. [P.]. (Type of *S. glaucus.*) |
| *i.* Hgr. | Malay Archipelago. | Bleeker Coll. |
| *k.* Yg. | Amboyna. | |
| *l.* Ad., skel. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |

* Types (Paris Museum, nos. 7409 & 7410) examined.

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### 30. Epinephelus chlorostigma.

Serranus tauvina (*non Forsk.*), *Geoffr. Descr. Egypte, Poiss.* p. 317, pl. xx. fig. 1 (1809).
Serranus areolatus (*non Forsk.*), *Cuv. & Val.* ii. p. 350 (1828); *Günth.* i. p. 149 (1859); *Playf. Proc. Zool. Soc.* 1867, p. 848; *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 675; *Day, Fish. Ind.* p. 12, pl. i. fig. 4 (1875), *Suppl.* p. 780 (1888), *and Faun. Ind., Fish.* i. p. 445 (1889).
Serranus chlorostigma, *Cuv. & Val. t. c.* p. 352; *Günth. t. c.* p. 151.
Serranus waandersii, *Bleek. Nat. Tijdschr. Nederl. Ind.* xvii. 1858, p. 152.
Serranus geoffroyi, *Klunz. l. c., and Fische Roth. Meer.* p. 3 (1884).
Epinephelus waandersii, *Bleek. Verh. Ak. Amst.* xiv. no. 2, 1873, p. 68, *and Atl. Ichth.* p. 47, pl. cclxxxi. fig. 1 (1876).
Serranus celebicus, var. multipunctatus, *Kossm. & Räub. Ergebn. Reise Roth. Meer.* p. 6 (1877).
Serranus assabensis, *Giglioli, Ann. Mus. Genova*, (2) vi. 1888, p. 68.
Epinephelus chlorostigma, *Sauv. Hist. Madag., Poiss.* p. 73 (1891).
Epinephelus areolatus, *Sauv. l. c.* p. 74.

D. XI 16–17 (rarely 15). A. III 8. Sc. 115–140 $\frac{13-18}{46-55}$; l. l. 55–75.

Teeth in narrow bands, in two series on the sides of the mandible; canines small. Depth of body 3 to $3\frac{1}{2}$ times in total length, length of head $2\frac{4}{5}$ to 3 times. Snout longer than diameter of eye, which is $4\frac{1}{2}$ to 6 times in length of head, and nearly equal to interorbital width; lower jaw projecting; maxillary extending to below centre or posterior border of eye, the width of its distal extremity $\frac{2}{5}$ to $\frac{3}{4}$ diameter of eye; præopercle usually a little produced at the angle, which is armed with more or less enlarged spines; opercular spines nearly equidistant, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers at least as long as gill-fringes, 15 or 16 on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth or fourth and fifth spines longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, as long as or a little longer than longest soft rays. Pectoral $\frac{2}{5}$ to $\frac{2}{3}$ length of head. Ventral a little shorter, usually not reaching anus. Second anal spine a little shorter than third, $\frac{1}{4}$ length of head, $\frac{1}{3}$ to $\frac{2}{5}$ length of longest soft rays; the soft portion more or less distinctly pointed in adult specimens. Caudal truncate or slightly emarginate. Scales mostly ciliated. Greyish or brownish white or pale olive, covered all over with very numerous, dark olive-brown or blackish, round or hexagonal spots, separated by very narrow, often linear, intervals of the pale ground-colour; the spots becoming smaller and more numerous on the body in old specimens; fins spotted like the body, the soft dorsal and caudal sometimes with a very narrow white edge.

Total length 630 millim.

Indian Ocean; China Sea.

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| | | |
|---|---|---|
| *a*. Hgr., skin. | Red Sea. | J. Burton, Esq. [P.]. |
| *b*. Yg., stffd. | Red Sea. | |
| *c–e*. Hgr. & yg. | Massowah. | Marquis G. Doria [P.]. |
| *f*. Yg., skin. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *g*. Yg. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *h–i*. Yg. | Seychelles. | Sir Lambert Playfair [P.]. |
| *k–l*, *m*. Ad. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *n*. Ad., stffd. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *o*. Ad., skin. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *p*. Ad. | China. | Intern. Fisheries Exhib. 1883. |

### 31. Epinephelus goreensis *.

Serranus goreensis, *Cuv. & Val.* vi. p. 511 (1830); *Jenyns, Zool. Beagle, Fish.* p. 5 (1842); *Günth.* i. p. 133 (1859); *Trosch. Arch. f. Nat.* 1866, p. 196; *Steind. Denkschr. Ak. Wien*, xliv. 1882, p. 22, pl. i. fig. 2.

Epinephelus goreensis, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 358.

D. XI 15–16. A. III 8. Sc. 125–140 $\frac{17-20}{48-50}$; l. l. 72–75.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body $3\frac{1}{6}$ to $3\frac{2}{3}$ times in total length, length of head 3 times. Snout $1\frac{1}{4}$ to $1\frac{1}{2}$ diameter of eye, which is $4\frac{1}{2}$ to $5\frac{1}{2}$ times in the length of the head and nearly equal to interorbital width; lower jaw projecting; maxillary extending to below posterior third or posterior border of eye; præopercular border angular, with 4 or 5 enlarged spines at the angle; middle opercular spine nearer lower than upper, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary naked. Gill-rakers long and slender, longer than gill-fringes, 16 to 18 on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, $\frac{1}{3}$ to $\frac{2}{3}$ length of head, and as long as longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral a little shorter, not reaching anus. Second and third anal spines equal, or third a little longer than second, nearly $\frac{1}{4}$ length of head, $\frac{1}{2}$ to $\frac{2}{3}$ length of longest soft rays. Caudal truncate or slightly emarginate. Scales ciliated. Brown, uniform or with ill-defined darker marblings; a blackish streak above the upper edge of the maxillary; dorsal and anal fins with a violet edge; ventrals blackish.

Total length 490 millim. Grows to 550 or more.

Coasts of Senegambia and the Canary Islands.

### 32. Epinephelus coromandelicus.

Serranus longispinis, part., *Playf. & Günth. Fish. Zanzib.* p. 10 (1866).

Serranus waandersii (*non Bleek.*), *Day, Fish. Ind.* p. 12, pl. viii. fig. 1 (1875).

* Described from the type specimens (Paris Mus., nos. 7323, 7324).

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Epinephelus dayi (*non Bleek.* 1873), *Bleek. Atl. Ichth.* vii. p. 47 (1876).

Serranus coromandelicus, *Day, op. cit.* p. 746 (1878), *and Faun. Ind., Fish.* i. p. 445 (1889); *Bouleng. Proc. Zool. Soc.* 1889, p. 237.

D. XI 16–18. A. III 8. Sc. 120–150 $\frac{14-20}{50-58}$; l. l. 58–70.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate or small. Depth of body $3\frac{1}{3}$ to $3\frac{3}{4}$ times in total length, length of head 3 to $3\frac{1}{2}$ times. Snout longer than diameter of eye, which is $4\frac{1}{2}$ to 6 times in length of head and nearly equal to or a little narrower than interorbital width; lower jaw projecting; maxillary extending to below centre or posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; angle of præopercle obtuse, not or but very slightly produced, with enlarged serræ; middle opercular spine nearer lower than upper, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers nearly as long as gill-fringes, 16 to 18 on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth spines longest, $\frac{1}{2}$ to $\frac{2}{3}$ length of head, as long as or longer than longest soft rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral a little shorter, not reaching anus. Second anal spine a little shorter than third, $\frac{1}{4}$ to $\frac{1}{3}$ length of head, $\frac{1}{2}$ to $\frac{2}{3}$ length of longest soft rays. Caudal truncate or slightly emarginate. Scales mostly ciliated. Dark purplish brown, paler beneath, uniform or with scattered subcircular yellowish or whitish spots on the body, dorsal fin, and upper third of caudal; spots on the head, if present, smaller; dorsal and anal fins blackish at the end, sometimes with a narrow white edge; pectoral fin orange in life.

Total length 660 millim.

Coasts of India and mouth of the Persian Gulf.

| | | |
|---|---|---|
| *a*. Ad., skin. | Madras. | F. Day, Esq. [P.]. (One of the types.) |
| *b*. Yg. | Madras. | F. Day, Esq. [P.]. |
| *c*. Ad., stffd. | Madras. | E. Thurston, Esq. [C.]. |
| *d*, *e*. Ad., stffd. | Madras. | |
| *f*. Ad., stffd. | Muscat. | East India Co. [P.]. |
| *g*–*k*. Ad. & hgr. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *l*, *m*, *n*. Ad., skins. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |

## 33. Epinephelus caninus.

Serranus caninus, *Val. in Webb & Berthel. Iles Canar., Ichth.* p. 10 (1843)*; *Steind. Sitzb. Ak. Wien*, lxxxvi. i. 1882, p. 65, pl. ii. fig. 1; *Vincig. Ann. Mus. Genova*, xviii. 1883, p. 497.

Cerna canina, *Doderl. Prosp. Pesci Sicil.* p. 36 (1879), *and Giorn. Sc. Palermo*, xv. 1882, p. 193, pl. i. fig. 2.

Epinephelus caninus, *Doderl. Man. Ittiol. Medit.* iv. p. 59 (1889).

* The specimen is not in the Paris Museum.

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D. XI 13–14. A. III 8. Sc. 125–130 $\frac{16}{-}$; l. l. 75–80.

Teeth in narrow bands, in two series on the sides of the mandible; canines strong. Depth of body about 3 times in total length, length of head $2\frac{1}{2}$ to $2\frac{3}{4}$ times; snout longer than diameter of eye, which is $5\frac{1}{2}$ to 7 times in length of head and nearly equal to interorbital width; posterior nostril considerably larger than the anterior; lower jaw projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity $\frac{2}{3}$ to $\frac{3}{4}$ diameter of eye; præopercle angular, with enlarged spines at the angle; opercular spines nearly equidistant, lower not extending further back than upper; opercular flap pointed; head nearly entirely covered with mostly ctenoid scales, including the maxillary. Gill-rakers 18 on lower part of anterior arch, the longest about as long as gill-fringes. Dorsal originating above base of pectoral; third or fourth spine longest, $\frac{2}{5}$ length of head, as long as longest soft rays. Pectoral $\frac{3}{5}$ length of head. Ventral shorter, not reaching anus. Second anal spine as long as third, not quite $\frac{1}{3}$ length of head, $\frac{2}{3}$ length of longest soft rays. Caudal truncate. Scales rough, strongly ciliated. Greyish or reddish brown; cheek with two oblique darker streaks.

Total length 1360 millim.

Mediterranean and neighbouring parts of the Atlantic.

### 34. Epinephelus latifasciatus.

Serranus latifasciatus, *Temm. & Schleg. Faun. Japon., Pisc.* p. 6 (1844); *Günth.* i. p. 154 (1859), *and Zool. Rec.* 1868, p. 143; *Day, Proc. Zool. Soc.* 1888, p. 259, *Fish. Ind., Suppl.* p. 780, figs. (1888), *and Faun. Ind., Fish.* i. p. 455 (1889); *Bouleng. Proc. Zool. Soc.* 1889, pp. 237, 244.

? Serranus epistictus, *Temm. & Schleg. l. c.* p. 8; *Bleek. Verh. Batav. Gen.* xxvi. no. 4, 1855, p. 60, pl. ii. fig. 1; *Günth. t. c.* p. 128.

Serranus grammicus, *Day, Proc. Zool. Soc.* 1867, p. 700, *and Fish. Ind.* p. 28, pl. v. fig. 4 (1875).

Priacanthichthys maderaspatensis, *Day, Proc. Zool. Soc.* 1868, p. 193, fig.

D. XI 12–13. A. III 8. Sc. 100–115 $\frac{10-12}{35-42}$; l. l. 65–70.

Teeth in narrow bands, in two series on the sides of the mandible. Depth of body $3\frac{1}{4}$ to $3\frac{2}{3}$ times in total length, length of head $2\frac{3}{4}$ to 3 times. Snout as long as or slightly longer than diameter of eye, which is $5\frac{1}{2}$ to 6 times in length of head and equal to interorbital width; lower jaw projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity about $\frac{2}{3}$ diameter of eye; præopercle produced at the angle, which is armed with 5 to 7 strong spines; middle opercular spine nearer lower than upper, lower not extending further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary naked or with a few scales. Gill-rakers short, 16 on lower part of anterior arch. Dorsal originating above base of pectoral; third or third and fourth spines longest, $\frac{2}{7}$ to $\frac{1}{3}$ length

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of head; last spine $\frac{1}{5}$ to $\frac{2}{5}$ length of head; longest soft rays a little longer than longest spine. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Third anal spine longest, $\frac{1}{5}$ to $\frac{2}{5}$ length of head, and much shorter than the soft rays. Caudal truncate in the adult, rounded in the young. Scales all or greater part cycloid. Brown, with three black lines on each side, originating from the eye, the upper extending to the last dorsal spines, the second to the middle of the soft dorsal, the third to the base of the caudal; these lines may be broken up into series of small spots in the adult; spinous dorsal tipped with black; soft dorsal and caudal spotted with black.

Total length 700 millim.

Indian and West Pacific Oceans, from the mouth of the Persian Gulf to China and Japan.

| | | |
|---|---|---|
| *a*. Ad. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *b*, *c*. Ad., stffd. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *d*. Ad., skin. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *e*. Ad., stffd. | Bombay. | Secretary of State for India [P.]. |
| *f*. Yg. | Madras. | F. Day, Esq. [P.]. (One of the types of *Priacanthichthys maderaspatensis*.) |
| *g*. Ad. | Shanghai. | Shanghai Mus. [P.]. |

### 35. Epinephelus præopercularis. (Plate V.)

Serranus præopercularis, *Bouleng. Proc. Zool. Soc.* 1887, p. 654, *and* 1889, p. 244.

Serranus morrhua, part., *Day, Proc. Zool. Soc.* 1888, p. 258, *and Suppl. Fish. Ind.* p. 780 (1888).

D. XI 14–15. A. III 8. Sc. 105–120 $\frac{13-16}{45-55}$; l. l. 65–72.

Teeth in narrow bands, in two series on the sides of the mandible; canines strong. Depth of body 3 to $3\frac{1}{2}$ times in total length, length of head $2\frac{1}{2}$ to 3 times. Snout as long as or a little longer than diameter of eye, which is $4\frac{1}{2}$ to 5 times in length of head; interorbital width 5 to 6 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præopercle produced at the angle, which is armed with 3 to 7 strong spines; middle opercular spine nearer lower than upper, lower much further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary naked or with a few scales. Gill-rakers moderate, 15 or 16 on lower part of anterior arch. Dorsal originating above base of pectoral; third or third and fourth spines longest, $\frac{1}{3}$ length of head; last spine $\frac{1}{4}$ to $\frac{2}{7}$ length of head; longest soft rays as long as or a little longer than longest spine. Pectoral $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, or third a little longer, $\frac{1}{5}$ to $\frac{1}{4}$ length of head, and much shorter than soft rays. Caudal truncate in the adult, rounded in the young. Scales mostly ciliated. Brown, sides spotted or dotted with black; young with a dark streak from the eye to above the angle of the præ-

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opercle; dorsal, anal, and caudal blackish at the end, the soft dorsal and anal with a narrow whitish margin.

Total length 800 millim.

Mouth of the Persian Gulf.

| | | | |
|---|---|---|---|
| *a*. Ad., stffd. | Muscat. | A. S. G. Jayakar, Esq. [P.]. | (Types.) |
| *b*. Hgr. | Muscat. | A. S. G. Jayakar, Esq. [P.]. | (Types.) |
| *c–d*. Hgr. | Muscat. | A. S. G. Jayakar, Esq. [P.]. | |
| *e, f, g*. Ad. & hgr., stffd. | Muscat. | A. S. G. Jayakar, Esq. [P.]. | |
| *h, i, k, l*. Ad., skins. | Muscat. | A. S. G. Jayakar, Esq. [P.]. | |

### 36. Epinephelus morrhua.

Serranus morrhua, *Cuv. & Val.* ix. p. 434 (1833); *Günth.* i. p. 154 (1859); *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 678; *Day, Fish. Ind.* p. 21, pl. v. fig. 1 (1875); *Klunz. Fisch. Roth. Meer.* p. 3, pl. i. fig. 2 (1884); *Day, Faun. Ind., Fish.* i. p. 453 (1889); *Bouleng. Proc. Zool. Soc.* 1889, p. 244.

Serranus pœcilonotus, *Temm. & Schleg. Faun. Japon., Pisc.* p. 6, pl. iv. A. fig. 1 (1844); *Bleek. Verh. Batav. Gen.* xxvi, no. 4, 1855, p. 61; *Günth. t. c.* p. 155.

Serranus angularis (*non C. & V.*), *Günth. t. c.* p. 126.

Serranus radiatus, *Day, Proc. Zool. Soc.* 1867, p. 699.

Serranus brunneus (*non Bl.*), *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 230, pl. v. figs. 1 & 2.

Epinephelus morrhua, *Sauv. Hist. Madag., Poiss.* p. 65 (1891).

D. XI 14–15. A. III 8. Sc. 105–115 $\frac{12-15}{45-55}$; l. l. 60–65.

Teeth in narrow bands, in two series on the sides of the mandible; canines very strong. Depth of body 3 to 3½ times in total length, length of head 2½ to 2¾ times. Snout as long as or slightly longer than diameter of eye, which is 5 to 5½ times in length of head; interorbital width 6 to 7 times in length of head; lower jaw projecting; maxillary extending to below posterior third or posterior border of eye, the width of its distal extremity ½ to ⅔ diameter of eye; præopercle usually produced at the angle, which is armed with 3 to 5 strong spines; opercular spines equidistant, lower much further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary naked or with a few scales. Gill-rakers as long as gill-fringes, 15 or 16 on lower part of anterior arch. Dorsal originating above base of pectoral; third or third and fourth spines longest, ⅔ to ¾ length of head; last spine ⅓ to ½ length of head; longest soft rays as long as or shorter than longest spine. Pectoral ½ to ⅔ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, ¼ to ⅓ length of head, and much shorter than soft rays. Caudal truncate in the adult, rounded in the young. Scales ciliated. Brown, with undulous oblique streaks or series of dots, ascending towards the dorsal, the remnants of three oblique dark bands which are well marked in the young; three or four oblique dark streaks on the side of the head; soft dorsal and caudal spotted with dark brown.

Total length 540 millim.

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Indian and West Pacific Oceans (Red Sea, Mauritius, Mouth of the Persian Gulf, Madras, Japan).

| | | |
|---|---|---|
| *a–b.* Ad. & hgr. | Red Sea. | Dr. Klunzinger [C.]. |
| *c, d.* Ad., stffd. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *e, f, g.* Ad., skins. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *h.* Ad., skin. | Mauritius. | M. V. de Robillard [C.]. |
| *i.* Hgr., stffd. | Mauritius. | |

## 37. Epinephelus diacanthus.

Serranus diacanthus, *Cuv. & Val.* ii. p. 319 (1828); *Kner, Novara, Fische*, p. 20 (1865); *Day, Fish. Ind.* p. 17, pl. iii. fig. 4 (1875), *and Faun. Ind., Fish.* i. p. 449 (1889).
Serranus nebulosus (*non C. & V.*), *Richards. Rep. Ichth. China*, p. 232 (1846).
Serranus trimaculatus (*non C. & V.*), *Bleek. Acta Soc. Sc. Ind. Neerl.* iii. no. 9, 1858, p. 8.
Serranus sexfasciatus (*non C. & V.*), *Günth.* i. p. 108 (1859); *Day, Fish. Malab.* p. 2 (1865).
Serranus diacanthus, part., *Günth. t. c.* p. 110.
Serranus fasciatomaculatus, *Peters, Mon. Berl. Ac.* 1865, p. 111.
Epinephelus dayi, *Bleek. Verh. Ak. Amst.* xiv. no. 2, 1873, p. 105.
Epinephelus diacanthus, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1873, p. 137, *and Atl. Ichth.* vii. p. 55 (1876).
? Serranus salmonoides, *Kossm. & Räub. Ergebn. Reise Roth. Meer.* p. 7 (1877).

D. XI 16–17 (rarely 15). A. III 8. Sc. 105–120 $\frac{11-15}{40-46}$; l. l. 52–60.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body 3 to $3\frac{1}{2}$ times in total length, length of head $2\frac{1}{2}$ to 3 times. Snout as long as or slightly longer than diameter of eye, which is $4\frac{1}{2}$ to $5\frac{1}{2}$ times in length of head; interorbital width 6 to 8 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye; præopercular border forming nearly a right angle, the angle often produced and armed with two to five, usually two, very strong spines; middle opercular spine usually nearer lower than upper, lower much further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary naked or partially scaly. Gill-rakers moderate, 15 or 16 on lower part of anterior arch. Dorsal originating above base of pectoral; third or third and fourth spines longest, $\frac{1}{3}$ to $\frac{1}{2}$ length of head; last spine $\frac{1}{4}$ to $\frac{2}{7}$ length of head; longest soft rays as long as or a little longer than longest spine. Pectoral $\frac{2}{5}$ to $\frac{3}{4}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, or second a little longer than third, $\frac{1}{4}$ to $\frac{1}{3}$ length of head, and much shorter than soft rays. Caudal subtruncate in the adult, rounded in the young. Scales mostly ciliated. Brown, with or without small darker spots, with five or six dark vertical bands; fins unspotted, dark at the end; a dark oblique streak may be present on the cheek.

Total length 520 millim.



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From the mouth of the Persian Gulf to the coasts of India and China.

| | | |
|---|---|---|
| *a.* Ad. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *b, c.* Ad., skins. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *d–e.* Yg. | Bombay. | F. Day, Esq. [P.]. |
| *f.* Yg. | Madras. | F. Day, Esq. [P.]. |
| *g, h.* Hgr. | India. | Gen. Hardwicke [P.]. |
| *i.* Yg., skin. | India. | B. Hodgson, Esq. [P.]. |
| *k.* Yg. | Hong Kong. | Sir J. Richardson [P.]. |
| *l.* Yg. | Hong Kong. | Haslar Collection. |
| *m.* Yg. | Amoy. | |
| *n–o.* Ad. & hgr. | Formosa. | R. Swinhoe, Esq. [C.]. |
| *p.* Hgr. | Shanghai. | |
| *q.* Yg. | China. | J. R. Reeves, Esq. [P.]. |
| *r.* Hgr., skin. | China. | J. R. Reeves, Esq. [P.]. |
| *s.* Ad. | China. | Intern. Fisheries Exhib. 1883. |
| *t.* Yg. | China. | |

### 38. Epinephelus catus.

*Catesby, Nat. Hist. Carol.* pl. xiv. (1743).
Perca guttata, part., *Linn. S. N.* i. p. 485 (1766).
? Holocentrus punctatus, *Bloch, Ausl. Fische*, iv. p. 88, pl. ccxli. (1790).
Serranus apua (*non Bl.*), *Cuv. & Val.* ii. p. 287 (1828); *Günth.* i. p. 140 (1859).
Serranus maculosus, *Cuv. & Val. t. c.* p. 332 *.
Serranus catus, *Cuv. & Val. t. c.* p. 373; *Guichen. in R. de la Sagra, Hist. Cuba*, ii. p. 13 (1853).
Serranus nigriculus, *Cuv. & Val. t. c.* p. 375.
Serranus arara, *Cuv. & Val. t. c.* p. 377; *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 69 (1874).
Serranus lunulatus, *Cuv. & Val. t. c.* p. 379; *Guichen. l. c.* p. 15.
Serranus maculatus, *Günth. t. c.* p. 130; *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 83 (1877).
Serranus ongus, *s.* angustifrons, *Steind. Verh. zool.-bot. Ges. Wien*, xiv. 1864, p. 230, pl. vii. figs. 2 & 3.
Serranus maculatus, *vars.* catus *et* cubanus, *Peters, Mon. Berl. Ac.* 1865, p. 110.
Epinephelus lunulatus, *Poey, Repert. Cuba*, i. 1866, p. 201.
Epinephelus cubanus, *Poey, l. c.* p. 202.
Epinephelus guttatus, *Goode, Bull. U.S. Nat. Mus.* no. 5, 1876, p. 58; *Jord. & Gilb. Syn. Fish. N. Am.* p. 919 (1882).
Serranus stathouderi, *Vaill. Miss. Sc. Mex., Poiss.* p. 69 (1877).
Epinephelus apua, *Jord. & Gilb. l. c.* p. 973; *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 389.
Epinephelus catus, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 355.
Dermatolepis angustifrons, *Jord. & Eigenm. l. c.* p. 375.

D. XI 16–17. A. III 8. Sc. 100–110 $\frac{11-12}{45-55}$; l. l. 50–55.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body $2\frac{4}{5}$ to $3\frac{1}{5}$ times in total length,

* Type (Paris Museum, no. 7360) examined.

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length of head $2\frac{3}{5}$ to $2\frac{2}{3}$ times. Snout as long as or slightly longer than diameter of eye, which is 4 to $5\frac{1}{2}$ times in length of head; interorbital width 7 to 8 times in length of head; lower jaw projecting; maxillary extending to below posterior third or posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præopercular border obtusely angulate, with moderately enlarged serræ at the angle; opercular spines equidistant or middle nearer lower than upper, lower further back than upper; opercular flap pointed, its upper border nearly straight; head covered with cycloid scales; maxillary naked or scaly. Gill-rakers rather long, longest longer than gill-fringes, 15 to 17 on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth spines longest, $\frac{2}{5}$ to $\frac{2}{7}$ length of head, much longer than last spine, as long as or longer than longest soft rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second anal spine as long as third, $\frac{1}{4}$ to $\frac{1}{3}$ length of head, $\frac{2}{5}$ to $\frac{2}{3}$ length of longest soft rays. Caudal rounded in the young, subtruncate in the adult. Scales mostly ciliated. Yellow to olive or purplish brown above, paler beneath, with three rather indistinct darker oblique vertical bars on each side; head and body with numerous round brown or bright red spots; the latter may have a brown central dot; pectorals yellow or red, with or without small spots; soft dorsal, anal, and caudal fins yellow, with a broad dark brown or black border and a fine whitish edge.

Total length 370 millim.

Western Atlantic, from the Bermudas and Florida to Brazil.

| | | |
|---|---|---|
| *a*. Ad. | Bermuda. | J. M. Jones, Esq. [C.]. |
| *b–c*. Ad. | Jamaica. | Intern. Fisheries Exhib. 1883. |
| *d*, *e*, *f*, *g*. Ad., hgr., & yg., skins. | Jamaica. | Parnell Collection. |
| *h*. Hgr. | St. Thomas. | H.M.S. 'Challenger.' |
| *i–l*. Hgr. | St. Croix. | |
| *m*. Ad., stffd. | W. Indies. | |
| *n*, *o*. Hgr., skins. | W. Indies. | |

### 39. Epinephelus maculatus.

Holocentrus maculatus, *Bloch, Ausl. Fische*, iv. p. 96, pl. ccxlii. fig. 3 (1790).
Holocentrus albofuscus, *Lacép. Poiss.* iv. p. 384 (1802).
Serranus quoyanus, *Cuv. & Val.* vi. p. 519 (1830).
Serranus gaimardi, *Cuv. & Val. t. c.* p. 520; *Quoy & Gaim. Voy. Astrolabe, Poiss.* pl. iii. fig. 3 (1833); *Bleek. Nat. Tijdschr. Nederl. Ind.* iv. 1853, p. 455; *Günth.* i. p. 150 (1859).
Serranus sebæ, *Bleek. op. cit.* vi. 1854, p. 488.
Serranus maculatus, *Bleek. op. cit.* xi. 1856, p. 398; *Day, Fish. Ind.* p. 14, pl. ii. fig. 4 (1875), *and Faun. Ind., Fish.* i. p. 447 (1889).
Serranus albofuscus, *Günth. t. c.* p. 108.
Serranus sebæ, part., *Günth. t. c.* p. 137.
Epinephelus sebæ, *Bleek. Nederl. Tijdschr. Dierk.* ii. 1865, p. 277.
Serranus longispinis, *Kner, Novara, Fische*, p. 27, pl. ii. fig. 2 (1865).
Serranus longispinis, part., *Playf. & Günth. Fish. Zanz.* p. 10 (1866).



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Serranus medurensis, *Günth. Fische d. Südsee*, i. p. 8, pl. ix. fig. A (1873).

Epinephelus maculatus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 75, *and Atl. Ichth.* vii. p. 50, pls. cclxxxv. fig. 1, cclxxxvi. fig. 3, cclxxxix. fig. 2, ccxciv. fig. 2, and cccv. fig. 2 (1876).

D. XI* 16-17. A. III 8. Sc. 105–110 $\frac{12-15}{40-45}$; l. l. 53–56.

Teeth small, in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body nearly equal to length of head, 3 times in total length. Snout a little longer than diameter of eye, which is 5 to $5\frac{1}{2}$ times in length of head; interorbital width 6 to 7 times in length of head; nostrils close together; lower jaw projecting; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity $\frac{2}{3}$ to $\frac{3}{4}$ diameter of eye; præopercular border obtusely angulate, a little produced at the angle, which is armed with enlarged serræ; middle opercular spine a little nearer lower than upper, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers long and slender, longer than gill-fringes, 10 to 12, and 4 to 6 rudiments, on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, $\frac{3}{7}$ to $\frac{1}{2}$ length of head, at least $1\frac{1}{2}$ as long as last spine, longer than longest soft rays. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral a little shorter, reaching anus or not quite so far. Second anal spine slightly shorter than third, $\frac{1}{5}$ to $\frac{1}{4}$ length of head, about $\frac{1}{2}$ length of soft rays. Caudal rounded in the young, subtruncate in the adult. Scales mostly ciliated. Adult brown above, all over with roundish black spots; young dark, with round black spots and some large bluish-white blotches, the largest being a cross-bar in front of the dorsal, descending to the opercle, and a vertical bar on the posterior half of the spinous dorsal, descending to the lateral line.

Total length 400 millim.

Indian Ocean, Western Tropical Pacific Ocean.

| | | |
|---|---|---|
| *a, b.* Ad. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *c.* Ad., skin. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *d.* Hgr. | Mauritius. | P. L. Sclater, Esq. [P.]. |
| *e.* Ad. | Ceylon. | H. Nevill, Esq. [P.]. |
| *f.* Ad. | Manado, Celebes. | Dr. A. B. Meyer [C.]. |
| *g.* Ad. | Ponape, Caroline Ids. | Museum Godeffroy. |
| *h.* Ad. | Meduro, Marshall Ids. | Museum Godeffroy. (Type of *S. medurensis*.) |

## 40. Epinephelus bleekeri.

Serranus variolosus (*non C. & V.*), *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 35.

Serranus hexagonatus, part., *Günth.* i. p. 140 (1859).

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* In one specimen X.

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Epinephelus variolosus, *Bleek. Nederl. Tijdschr. Dierk.* ii. 1865, p. 277, *Verh. Akad. Amst.* xiv. no. 2, 1873, p. 71, *and Atl. Ichth.* vi. p. 48, pl. ccc. fig. 3 (1876).
Serranus bleekeri, *Vaill. Miss. Sc. Mex., Poiss.* p. 99 (1877).

D. XI 16–17. A. III 8. Sc. 110–115 $\frac{13-15}{45-50}$; l. l. 55–60.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body 3 to $3\frac{1}{3}$ times in total length, length of head $2\frac{2}{3}$ to 3 times. Snout longer than diameter of eye, which is $4\frac{1}{2}$ to 5 times in length of head; interorbital width 6 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{3}{7}$ to $\frac{2}{3}$ diameter of eye; præopercular border subrectangular, rounded or slightly produced at the angle, which is armed with several enlarged serræ; opercular spines nearly equidistant, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers long and slender, longer than gill-fringes, 16 or 17 on lower part of anterior arch. Dorsal originating above base of pectoral; third or third and fourth spines longest, $\frac{2}{5}$ length of head; last spine $\frac{1}{3}$ length of head; longest soft rays a little longer than longest spine. Pectoral $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, about $\frac{1}{4}$ length of head, much shorter than soft rays. Caudal subtruncate. Scales mostly ciliated. Greyish or pale brown, all over with round reddish-brown spots; lower half of caudal purplish in life.

Total length 250 millim.

Malay Archipelago.

| | | |
|---|---|---|
| *a*. Ad. | N. Celebes. | Dr. A. B. Meyer [C.]. |
| *b*. Yg. | Singapore. | |

## 41. Epinephelus brunneus.

Epinephelus brunneus, *Bloch, Ausl. Fische*, vii. p. 15, pl. cccxviii. fig. 2 (1793).
Serranus kawamebari (*non Temm. & Schleg.*), *Richards. Rep. Ichth. China*, p. 234 (1846).
Serranus brunneus, *Günth.* i. p. 107 (1859).

D. XI 13. A. III 8. Sc. 110–115 $\frac{13-16}{45-50}$; l. l. 70–76.

Teeth in narrow bands, in two series on the sides of the mandible. Depth of body $3\frac{1}{3}$ to $3\frac{1}{2}$ times in total length, length of head $2\frac{3}{5}$ to $2\frac{2}{3}$ times. Snout $1\frac{1}{2}$ diameter of eye, which is 5 to $5\frac{1}{2}$ times in length of head; interorbital width 6 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye; præopercular border forming nearly a right angle, with 3 or 4 enlarged serræ at the angle; middle opercular spine nearer lower than upper, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary partially

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scaly. Gill-rakers moderate, 15 or 16 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the third, which is $\frac{1}{3}$ length of head and considerably shorter than longest soft rays. Pectoral $\frac{3}{5}$ length of head. Ventral shorter, not reaching anus. Third anal spine a little longer than second, nearly as long as longest dorsal spines, and much shorter than soft rays. Caudal rounded. Scales mostly cycloid. Brown, with five or six oblique darker cross-bands, which may be broken up into spots below the lateral line; oblique dark streaks from the eye to the cheek and opercle.

Total length 170 millim.

Chinese Sea.

| | | |
|---|---|---|
| *a–c.* Hgr. | Canton. | J. R. Reeves, Esq. [P.]. |

### 42. Epinephelus sexfasciatus.

Serranus sexfasciatus, *Cuv. & Val.* ii. p. 360 (1828); *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 38; *Day, Fish. Ind.* p. 17 (1875), *and Faun. Ind., Fish.* i. p. 449 (1889).

Serranus diacanthus, part., *Günth.* i. p. 110 (1859).

Epinephelus sexfasciatus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 103, *and Atl. Ichth.* vii. p. 60, pl. cclxxxi. fig. 2 (1876).

Serranus diacanthus, *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 231.

D. XI 15. A. III 8. Sc. 90–100 $\frac{9-12}{30-35}$; l. l. 52–56.

Teeth rather small, in narrow bands, in two series on the sides of the mandible. Depth of body 3 to 4 times in total length, length of head 3 times. Snout as long as diameter of eye, which is $3\frac{1}{2}$ to $4\frac{1}{2}$ times in length of head; interorbital width 6 to 7 times in length of head; lower jaw slightly projecting; maxillary extending to below posterior third or posterior border of eye, the width of its distal extremity about $\frac{1}{2}$ diameter of eye; two strong spines at angle of præopercle, lower pointing downwards; upper opercular spine indistinct; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary naked. Gill-rakers rather short, 13 or 14 on lower part of anterior arch. Dorsal originating above base of pectoral; third or third and fourth spines longest, $\frac{1}{2}$ length of head; last spine $\frac{2}{5}$ length of head; soft rays as long as longest spines. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral shorter, nearly reaching anus. Snout and third anal spines equal, $\frac{2}{5}$ length of head and much shorter than soft rays. Caudal rounded. Scales ciliated. Brown or olive, with yellowish round spots and five or six blackish vertical bands or pairs of bands; pectorals yellowish; ventrals blackish at the end; dorsal and caudal with round black spots.

Total length 230 millim.

Malay Archipelago and Japan to Louisiade Archipelago.

| | | |
|---|---|---|
| *a.* Hgr. | Philippines. | H.M.S. 'Challenger.' |
| *b–c.* Ad. & yg. | Arafura Sea. | H.M.S. 'Challenger.' |
| *d.* Hgr., skin. | Louisiade Archipelago. | H.M.S. 'Rattlesnake.' |

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### 43. Epinephelus amblycephalus.

Serranus amblycephalus, *Bleek. Act. Soc. Sc. Ind. Nerl.* ii. no. 7, 1857, p. 32; *Günth.* i. p. 503 (1859).

Epinephelus amblycephalus, *Bleek. Nederl. Tijdschr. Dierk.* ii. 1865, p. 277, *and Atl. Ichth.* vii. p. 46, pl. cclxxx. fig. 3 (1876).

D. XI 16. A. III 8. Sc. $120\frac{20}{60}$.

Depth of body $2\frac{4}{5}$ times in total length, length of head $2\frac{3}{5}$ times. Snout a little longer than diameter of eye, which is $4\frac{1}{2}$ times in length of head, and exceeds interorbital width; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{2}{3}$ diameter of eye; præopercular border subrectangular, with enlarged serræ at the angle; middle opercular spine nearer lower than upper, lower further back than upper; head nearly entirely scaly. Dorsal originating above base of pectoral; third spine longest, about $\frac{2}{5}$ length of head, and nearly as long as longest soft rays; last spine $\frac{1}{3}$ length of head. Pectoral $\frac{2}{3}$ length of head. Ventral a little shorter, nearly reaching anus. Second and third anal spines equal, $\frac{2}{7}$ length of head, and much shorter than soft rays. Caudal rounded. Yellowish brown, with seven broad purplish-brown bands edged in front and behind by a series of small round black spots; the first band across interorbital space and extending, in two branches, to the cheek; the second across nape; the third and fourth extending on spinous dorsal, the fifth and sixth extending on soft dorsal; the seventh on caudal peduncle.

Total length 300 millim.

Sea of Amboyna.

### 44. Epinephelus australis. (Plate VI.)

? Serranus australis, *Castelnau, Res. Fish. Austral.* p. 7 (1875).

D. XI 15. A. III 8. Sc. $100\frac{14}{42}$; l. l. 60.

Teeth in narrow bands, in two series on the sides of the mandible; canines small. Depth of body equal to length of head, $2\frac{4}{5}$ times in total length. Snout as long as diameter of eye, which is 5 times in length of head; interorbital width 7 times in length of head; lower jaw feebly projecting; maxillary extending to below posterior fourth of eye, the width of its distal extremity $\frac{2}{3}$ diameter of eye; præopercular border obtusely angular, with enlarged serræ at the angle; middle opercular spine nearer lower than upper, lower further back than upper; opercular flap pointed; head covered with cycloid scales; maxillary naked. Gill-rakers rather short, 16 on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth spine longest, a little longer than last, $\frac{2}{5}$ length of head, and a little shorter than longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral a little shorter, not reaching anus. Second and third anal spines equal, $\frac{1}{3}$ length of head, $\frac{3}{4}$ length of soft rays. Caudal rounded. Scales mostly ciliated. Dark purplish

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brown, with whitish dots, most distinct on the body below the lateral line.

Total length 180 millim.

New Britain (Cape York, Darnley Island).

| | | |
|---|---|---|
| *a*. Hgr. | New Britain. | Museum Godeffroy. |

### 45. Epinephelus dictiophorus.

Serranus dictiophorus, *Bleek. Act. Soc. Sc. Ind. Neerl.* i. no. 6, 1856, p. 38.

Serranus gaimardi (*non C. & V.*), *Playf. Proc. Zool. Soc.* 1867, p. 847.

Epinephelus dictiophorus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 115, *and Atl. Ichth.* vii. p. 65, pl. cclxxxiv. fig. 3 (1876).

D. XI 17. A. III 8. Sc. 100 $\frac{11-12}{45}$; l. l. 55.

Teeth in narrow bands, in two series on the sides of the mandible; canines small. Depth of body equal to length of head, 3 times in total length. Snout longer than diameter of eye, which is $5\frac{1}{2}$ to 6 times in length of head, and a little exceeds interorbital width; lower jaw projecting; maxillary extending to below centre or posterior third of eye, the width of its distal extremity $\frac{2}{3}$ diameter of eye; præopercular border obtusely angular, with enlarged serræ at the angle; middle opercular spine nearer lower than upper, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers moderate, 15 on lower part of anterior arch. Dorsal originating a little in advance of base of pectoral; third or fourth spine longest, nearly $\frac{1}{2}$ length of head, much longer than last spine, as long as or longer than longest soft rays, which are the anterior. Pectoral $\frac{2}{3}$ length of head. Ventral a little shorter, reaching anus. Second anal spine slightly shorter than third, $\frac{1}{4}$ length of head, $\frac{1}{2}$ length of longest soft rays. Caudal rounded. Scales mostly ciliated. Head and body closely covered with small orange or reddish-brown spots separated by a greyish network; soft fins orange, with large blackish-brown round spots; pectoral and soft dorsal edged with yellow; traces of four or five dark cross-bands on the body, which are probably well-marked in the young.

Total length 350 millim.

Indian Ocean (Seychelles, Celebes).

| | | |
|---|---|---|
| *a*. Ad. | Seychelles. | Sir Lambert Playfair [P.]. |
| *b*. Ad. | Seychelles. | Prof. E. P. Wright [C.]. |

The specimen from Honolulu referred to *E. dictiophorus* by Steindachner, Sitzb. Akad. Wien, cii. i. 1893, p. 219, belongs no doubt to a distinct species.

### 46. Epinephelus akaara.

Serranus akaara, *Temm. & Schleg. Faun. Japon., Pisc.* p. 9, pl. iii. fig. 1 (1844); *Richards. Rep. Ichth. China*, p. 231 (1846); *Bleek. Acta Soc. Sc. Ind. Neerl.* iii. no. 9, 1858, p. 9; *Günth.* i. p. 140 (1859).

Serranus sebæ, part., *Günth. t. c.* p. 137.

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D. XI 15–16. A. III 8. Sc. 95–110 $\frac{12-14}{34-45}$; l. l. 55–58.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body 3 to $3\frac{1}{2}$ times in total length, length of head 3 times. Snout a little longer than diameter of eye, which is $4\frac{1}{2}$ to $5\frac{1}{2}$ times in length of head; interorbital width $6\frac{1}{2}$ to 7 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or slightly beyond, the width of its distal extremity $\frac{2}{3}$ diameter of eye; præopercular border rounded at the angle, which is armed with rather strongly enlarged serræ; opercular spines equidistant, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary naked or with a few scales. Gill-rakers moderate, 15 or 16 on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth spines longest, $\frac{2}{5}$ length of head, considerably longer than last spine, as long as or a little shorter than longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second anal spine as long as or a little longer than third, $\frac{1}{4}$ to $\frac{1}{3}$ length of head, $\frac{2}{5}$ to $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales mostly ciliated. Brown, with more or less distinct round red spots; these become pale in spirit, surrounded by a dark network; a blackish blotch may be present under the last dorsal spines; fins without spots.

Total length 400 millim.

Coasts of China and Japan.

| | | |
|---|---|---|
| *a*. Ad. | Tokei, Japan. | H. B. Joyner, Esq. [P.]. |
| *b*, *c*. Hgr. | Japan. | |
| *d*. Hgr., stffd. | Japan. | Dr. Bürger [C.]. |
| *e*. Ad. | Shanghai. | Shanghai Museum [P.]. |
| *f*. Hgr. | China. | Intern. Fisheries Exhib. 1883. |
| *g*. Yg. | China. | Sir J. Richardson [P.]. |
| *h*. Yg. | China. | |
| *i*. Hgr., stffd. | India (?). | |

## 47. Epinephelus chlorocephalus.*

Serranus chlorocephalus, *Cuv. & Val.* vi. p. 522 (1830).

D. XI 17. A. III 8. Sc. 96 $\frac{11}{38}$; l. l. 55.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body nearly equal to length of head, 3 times in total length. Snout as long as diameter of eye, which is $4\frac{1}{3}$ times in length of head; interorbital width $6\frac{1}{2}$ times in length of head; lower jaw projecting; maxillary extending to below posterior fourth of eye, the width of its distal extremity $\frac{2}{5}$ diameter of eye; præopercular border obtusely angular, with moderately enlarged serræ at the angle; opercular spines

* Described from the type specimen (Paris Mus. no. 7543).

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equidistant, lower further back than upper; opercular flap acutely pointed; head nearly entirely covered with cycloid scales. Gill-rakers a little longer than gill-fringes, 15 on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth spines longest, nearly $\frac{1}{2}$ length of head, slightly longer than longest soft rays, and $1\frac{1}{2}$ as long as last spine. Pectoral nearly $\frac{2}{3}$ length of head. Ventral a little shorter, nearly reaching anus. Second and third anal spines equal, $\frac{1}{3}$ length of head, $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales mostly ciliated. Green; body with 7 or 8 alternately greenish-brown and orange stripes; pectorals and ventrals uniform pale green; dorsal and anal spotted with reddish brown at the base; caudal barred with reddish.

Total length 210 millim.

Tongatabu, Friendly Islands.

### 48. Epinephelus bontoides.

Serranus bontoides, *Bleek. Nat. Tijdschr. Nederl. Ind.* viii. 1855, p. 405; *Günth.* i. p. 149 (1859).

Epinephelus bontoides, *Bleek. Nederl. Tijdschr. Dierk.* ii. 1865, p. 277, *Verh. Akad. Amst.* xiv. no. 2, 1873, p. 85, *and Atl. Ichth.* vii. p. 53, pl. cclxxxvii. fig. 2 (1876).

D. XI 15–17. A. III 8. Sc. 85–95 $\frac{9-11}{35-45}$; l. l. 53–65.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body nearly equal to length of head, 3 times in total length. Snout as long as diameter of eye, which is 4 to $4\frac{1}{2}$ times in length of head; interorbital width 7 to 8 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity about $\frac{1}{2}$ diameter of eye; præopercular border obtusely angular, with moderately enlarged serræ at the angle; opercular spines nearly equidistant, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary naked or with a few scales. Gill-rakers moderate, 14 to 16 on lower part of anterior arch. Dorsal originating above base of pectoral; spines subequal from the third or fourth, which is $\frac{1}{3}$ to $\frac{2}{5}$ length of head, and a little shorter than soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral shorter, nearly reaching anus. Second anal spine a little longer than third, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, $\frac{2}{3}$ to $\frac{4}{5}$ length of longest soft rays. Caudal rounded. Scales mostly ciliated. Brown above, with more or less numerous black dots, which may be absent from the fins.

Total length 200 millim.

Malay Archipelago.

| | | |
|---|---|---|
| *a*. Hgr. | Malay Archipelago. | Dr. Bleeker. (As typical of *S. bontoides*.) |
| *b*. Ad. | Malay Archipelago. | Dr. Bleeker. |
| *c*. Ad. | N. Celebes. | Dr. A. B. Meyer [C.]. |

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### 49. Epinephelus megachir.

Serranus megachir, *Richards. Rep. Ichth. China*, p. 230 (1846).
Serranus gilberti, part., *Richards. l. c.*; *Günth.* i. p. 148 (1859).
Serranus pardalis, *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 37.
Serranus quoyanus (*non C. & V.*), *Günth. t. c.* p. 153.
Epinephelus pardalis, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 232.
Serranus hexagonatus, part., *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 683.
Epinephelus gilberti, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 91, *and Atl. Ichth.* vii. p. 56, pl. cccxxxi. fig. 3 (1876).
Serranus merra (*non Bl.*), *Day, Fish. Ind.* p. 13, pl. ii. fig. 2 (1875).
Serranus gilberti, *Day, l. c.* p. 746, *and Faun. Ind., Fish.* i. p. 446 (1889).
Serranus alatus, *Alleyne & Macleay, Proc. Linn. Soc. N. S. W.* i. 1876, p. 264, pl. iv. fig. 2.

D. XI 16–18. A. III 8. Sc. 85–95 $\frac{10-12}{40-45}$; l. l. 48–53.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body equal to length of head, $2\frac{1}{5}$ to 3 times in total length; snout with curved profile, short, as long as or a little shorter than diameter of eye, which is 4 to 5 times in length of head; interorbital width 6 to 7 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præopercle slightly produced at the angle, which is rounded and armed with enlarged serræ; opercular spines equidistant, lower further back than upper; opercular flap pointed, its upper border nearly straight; head nearly entirely covered with cycloid scales; maxillary naked or with a few scales. Gill-rakers moderate, 14 or 15 on lower part of anterior arch. Dorsal originating above base of pectoral; fourth or fifth spine longest, $\frac{2}{5}$ to $\frac{3}{4}$ length of head, longer than last spine, shorter than longest soft rays. Pectoral as long as or a little shorter than the head. Ventral shorter, reaching or nearly reaching anus. Second and third anal spines equal, $\frac{2}{7}$ to $\frac{1}{3}$ length of head, $\frac{1}{2}$ to $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales mostly ciliated. Brown, with large darker spots of unequal size, separated by a pale polygonal network; pectorals brown or blackish, uniform or spotted; dorsal, anal, and caudal fins with large round dark brown spots.

Total length 350 millim.

Indian and West tropical Pacific Oceans, from the coasts of India and China to the Louisiade Archipelago.

| | | |
|---|---|---|
| *a*. Ad., skin. | China. | J. R. Reeves, Esq. [P.]. (Type.) |
| *b*. Ad. | China. | |
| *c*, *d*. Ad., skins. | China Sea. | |
| *e*. Ad. | Siam. | |
| *f*–*g*. Hgr. | Philippines. | H. Veitch, Esq. [P.]. |
| *h*. Ad. | Celebes. | |
| *i*. Ad. | Mysol. | |
| *k*–*m*. Hgr. & yg. | Amboyna. | |
| *n*. Hgr., skin. | Louisiade Archipelago. | H.M.S. 'Rattlesnake.' |

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## 50. Epinephelus gilberti.

Serranus gilberti, *Richards. Ann. N. H.* ix. 1842, p. 19.
Serranus gilberti, part., *Richards. Rep. Ichth. China*, p. 230 (1846); *Günth.* i. p. 148 (1859).
Perca melanoscelidota, *Gronow, Cat.* p. 110 (1854).
Serranus cylindricus, *Günth. t. c.* p. 151; *Playf. & Günth. Fish. Zanz.* p. 11 (1866); *Günth. in Brenchley, Curaçoa*, p. 414, pl. xxviii. fig. A (1873).
Serranus carinatus, *Alleyne & Macleay, Proc. Linn. Soc. N. S. W.* i. 1876, p. 265, pl. iv. fig. 3.
Epinephelus cylindricus, *Sauv. Hist. Madag., Poiss.* p. 75, pl. viii. fig. 1 (1891).

D. XI* 16-17. A. III 8. Sc. 95–110 $\frac{10-12}{38-40}$; l. l. 55–60.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body $3\frac{1}{2}$ to $3\frac{3}{4}$ in total length, length of head 3 to $3\frac{1}{3}$ times; snout with curved profile, short, as long as diameter of eye, $\frac{1}{5}$ length of head; interorbital width 7 to 8 times in length of head; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye; præopercle slightly produced at the angle, which is rounded and armed with enlarged serræ; opercular spines equidistant, lower further back than upper; opercular flap pointed, its upper border nearly straight; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers moderate, 15 to 17 on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, $\frac{2}{5}$ to $\frac{3}{7}$ length of head, considerably longer than last spine, nearly as long as longest soft rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, or second a little longer, $\frac{2}{7}$ to $\frac{1}{3}$ length of head, $\frac{2}{5}$ to $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales mostly cycloid, some on the sides ciliated. Head and body covered with spots of unequal size, some black, some brown, separated by a pale or whitish polygonal network; pectoral dark at the end, with a narrow whitish edge; dorsal, anal, and caudal fins with large round dark brown or black spots; caudal with a fine whitish edge.

Total length 400 millim.

Indian Ocean, North Coast of Australia.

| | | | |
|---|---|---|---|
| *a.* Ad., skin. | Port Essington. | Mr. Gilbert [C.]. (Type.) |
| *b.* Yg. | Cape York. | Museum Godeffroy. |
| *c.* Ad. | Madras. | E. Thurston, Esq. [C.]. |
| *d.* Hgr. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *e.* Ad., stffd. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *f.* Hgr. | Madagascar. | Dr. J. E. Gray [P.]. (Type of *S. cylindricus.*) |
| *g.* Hgr., skin. | Indian Ocean. | Gronow Collection. (Type of *Perca melanoscelidota.*) |

* XII in spec. *b.*

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## 51. Epinephelus trimaculatus.

*Krusenstern, Reise*, pl. lxiv. fig. 2 (1810).
Serranus trimaculatus, *Cuv. & Val.* ii. p. 331 (1828); *Temm. & Schleg. Faun. Japon., Pisc.* p. 8 (1844); *Richards. Rep. Ichth. China*, p. 232 (1846); *Peters, Mon. Berl. Ac.* 1865, p. 110; *Kner, Novara, Fische*, p. 18 (1865).
Serranus ura, *Cuv. & Val. t. c.* p. 332.
Serranus ara, *Temm. & Schleg. l. c.*
Serranus trimaculatus, part., *Günth.* i. p. 109 (1859).
Epinephelus trimaculatus, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1873, p. 138.

D. XI 16–17. A. III 8. Sc. 100 $\frac{11-12}{40-42}$; l. l. 55–57.

Teeth in narrow bands, in two series on the sides of the mandible; canines rather small. Depth of body 3 to $3\frac{1}{5}$ times in total length, length of head $2\frac{4}{5}$ to 3 times. Snout as long as diameter of eye, which is $4\frac{1}{2}$ times in length of head; interorbital width $6\frac{1}{2}$ to 7 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or slightly beyond, the width of its distal extremity $\frac{2}{3}$ diameter of eye; præopercular border rounded, finely serrated, the serræ slightly enlarged at the angle; opercular spines equidistant, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers moderate, 15 on lower part of anterior arch. Dorsal originating above base of pectoral; fourth or fifth spine longest, $\frac{1}{3}$ to $\frac{2}{3}$ length of head, considerably longer than last spine, nearly as long as longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral a little shorter, reaching anus or not quite so far. Second and third anal spines equal, $\frac{1}{3}$ length of head, $\frac{2}{3}$ to $\frac{3}{4}$ length of longest soft rays. Caudal rounded. Scales mostly smooth, some on the sides ciliated. Pale brown, with small round darker spots; a large blackish blotch on the back, at the base of the 3 or 4 last dorsal spines, two smaller ones at the base of the soft dorsal, and a fourth on the caudal peduncle; pectorals and ventrals unspotted; soft dorsal, anal, and caudal fins with small brown spots.

Total length 200 millim.

Coasts of China and Japan.

| | | |
|---|---|---|
| *a*. Hgr. | China. | J. R. Reeves, Esq. [P.]. |
| *b*. Hgr. | China. | |

## 52. Epinephelus stoliczkæ.

Serranus stoliczkæ, *Day, Fish. Ind.* p. 11, pl. i. fig. 3 (1875), *and Faun. Ind., Fish.* i. p. 445 (1889).

D. XI 16–17*. A. III 8. Sc. 100–115 $\frac{11-13}{37-40}$; l. l. 50–58.

Teeth in narrow bands, in two series on the sides of the mandible; canines rather small, disappearing in old specimens. Depth of body

* Day gives the number of soft rays as 19, which is no doubt a misprint for 17.

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3 to 3¼ times in total length, length of head 2⅘ to 3 times. Snout as long as diameter of eye, which is 4 to 5 times in length of head; interorbital width 6 to 7 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or slightly beyond, the width of its distal extremity ⅖ to ½ diameter of eye; præopercular border rounded at the angle, which is armed with rather strongly enlarged serræ; opercular spines equidistant, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary with a few scales. Gill-rakers moderate, 14 or 15 on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth spines longest, ⅔ length of head, longer than last spine, as long as or a little longer than longest soft rays. Pectoral ⅔ length of head. Ventral shorter, reaching anus or not quite so far. Second and third anal spines equal, ⅔ to ¾ length of head, ½ to ⅔ length of longest soft rays. Caudal rounded. Scales smooth above lateral line, mostly ciliated on the sides. Pale brown or reddish, with darker spots and blackish dots, and with four dark vertical bars, the anterior below the base of the spinous dorsal, the second and third between the soft dorsal and the anal, the fourth on the caudal peduncle; base of pectoral whitish, with a black crescentic band; these markings disappear with age, old specimens being brown with small blackish spots.

Total length 380 millim.

From the Red Sea to the coast of Sind.

| | | |
|---|---|---|
| *a*. Hgr. | Massowah. | Museum Godeffroy. |
| *b–d*. Hgr. | Aden Hrabour. | R. Kirkpatrick, Esq. [P.]. |
| *e–f*. Yg. | Aden. | Capt. Shopland [P.]. |
| *g–o*. Ad. & hgr. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *p, q*. Ad., skins. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |

### 53. Epinephelus æneus.

Serranus æneus, *Geoffr. Descr. Egypte, Poiss.* p. 317, pl. xxi. fig. 3 (1809); *Cuv. & Val.* ii. p. 283 (1828); *Günth.* i. p. 134 (1859); *Peters, Mon. Berl. Ac.* 1865, p. 106; *Steind. Denkschr. Ak. Wien*, xliv. 1882, p. 21, pl. ii. fig. 1.

Perca robusta, *Couch, Mag. N. H.* v. 1832, p. 21, fig.

Serranus gigas, part., *Yarrell, Brit. Fish.* i. p. 15 (1835); *Couch, Brit. Fish.* i. p. 198, pl. xliii. (1862); *Day, Fish. Gr. Brit.* p. 16, pl. v. (1880).

Cerna ænea, *Doderl. Bull. Soc. Sc. Nat. Palermo*, 1878, no. 4, p. 2, *and Giorn. Sc. Palermo*, xv. 1882, p. 201, pl. ii. fig. 3.

Epinephelus æneus, *Doderl. Man. Ittiol. Medit.* iv. p. 67 (1889).

D. XI 14–15. A. III 8. Sc. 95–110 $\frac{13-15}{40}$; l. l. 65–76.

Teeth in narrow bands, in two series on the sides of the mandible; canines small. Depth of body 3 to 3½ times in total length, length of head 2⅘ to 3 times. Snout a little longer than diameter of eye, which is 4½ to 5½ times (to 8 times in old specimens) in the length of the head and nearly equals interorbital width; lower jaw

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projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye; præopercle slightly produced at the angle, which is armed with 3 to 5 strong teeth; opercular spines nearly equidistant, lower further back than upper; opercular flap acutely pointed; head nearly entirely covered with cycloid scales; maxillary naked or with a few scales. Gill-rakers slender, rather short, 12 to 15 on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, $\frac{2}{5}$ length of head, and nearly as long as longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral shorter, reaching anus or not quite so far. Second anal spine as long as or slightly shorter than third, $\frac{1}{4}$ to $\frac{1}{3}$ length of head, $\frac{2}{5}$ to $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales mostly smooth above the lateral line, feebly ciliated on the sides. Brown; young with five dark cross-bands and round reddish-brown spots, which disappear with age; three oblique bluish-white lines on each side of the head, two from the eye to the edge of the subopercle, the third behind the maxillary; ventrals and anal blackish at the end.

Total length 300 millim. Reaches to 820 millim.

Mediterranean; West Coast of Africa *.

| | | | |
|---|---|---|---|
| *a*. Yg. | Mediterranean Coast of Egypt. | Consul Petherick [P.] |
| *b*. Hgr. | Canary Ids. | Milan Museum [E.]. |
| *c*. Yg. | Gaboon. | |

### 54. Epinephelus dæmelii. (PLATE VII.)

Serranus dämelii, *Günth. Ann. & Mag. N. H.* (4) xvii. 1876, p. 391; *Casteln. Proc. Linn. Soc. N. S. W.* iii. 1878, p. 365.

D. XI 14. A. III 8. Sc. 110–130 $\frac{15-17}{50}$; l. l. 72–75.

Teeth in narrow bands, in two series on the sides of the mandible; canines strong. Depth of body 3 to $3\frac{1}{2}$ times in total length, length of head $2\frac{1}{2}$ to 3 times. Snout longer than diameter of eye, which is 6 or $6\frac{1}{2}$ times in length of head, and nearly equals interorbital width; nostrils widely remote from each other, posterior much the larger; lower jaw projecting; maxillary reaching beyond vertical of posterior border of eye, the width of its distal extremity $\frac{2}{3}$ to $\frac{3}{4}$ diameter of eye; præopercular border rounded, the serræ very slightly enlarged at the angle; middle opercular spine a little nearer lower than upper, both terminating on the same vertical line; opercular flap obtusely pointed, its upper border very convex; head nearly entirely covered with cycloid scales; maxillary with a band of small scales. Gill-rakers short and few, 11 or 12 (and a few rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, nearly as long as longest soft rays. Pectoral

* A specimen 3 feet long was taken with a line near Polperro, Cornwall, about 1830.

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$\frac{3}{5}$ length of head. Ventral shorter, not reaching anus. Second anal spine as long as or a little shorter than third, $\frac{1}{4}$ to $\frac{2}{7}$ length of head, $\frac{3}{5}$ to $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales ciliated in the young, cycloid in the adult. Purplish black, paler beneath, with or without faint bluish spots and oblique dark cross-bars; a black spot on dorsal side of caudal peduncle; soft dorsal, anal, and caudal black at the end, with a fine whitish edge.

Total length 630 millim.

Coast of New South Wales to Norfolk Island.

| | | |
|---|---|---|
| *a*. Hgr. | Sydney. | Museum Godeffroy. (Type.) |
| *b*. Ad. | Port Jackson. | Imperial Institute [P.]. |
| *c*. Ad., stffd. | New South Wales. | Australian Museum. |
| *d*. Hgr., skin. | New South Wales. | H.M.S. 'Rattlesnake.' |
| *e*. Hgr. | Norfolk Id. | Haslar Collection. |

### 55. Epinephelus undulatostriatus.

Serranus undulatostriatus, *Peters, Mon. Berl. Ac.* 1866, p. 518; *Casteln. Proc. Linn. Soc. N. S. W.* iii. 1878, p. 366; *Macleay, Proc. Linn. Soc. N. S. W.* v. 1880, p. 318.

Serranus guttulatus, *Macleay, Proc. Linn. Soc. N. S. W.* iii. 1878, p. 33, pl. ii.

D. XI 15–16. A. III 8. Sc. 110 $\frac{14-15}{40}$; l. l. 60.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body $2\frac{1}{2}$ to $2\frac{2}{3}$ times in total length, length of head $2\frac{2}{3}$ to 3 times. Snout longer than diameter of eye, which is $5\frac{1}{2}$ times in length of head and nearly equals interorbital width; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{2}{3}$ diameter of eye; præopercle angular, with three or four rather large spines at the angle; middle opercular spine a little nearer lower than upper, lower further back than upper; opercular flap pointed; head entirely covered with cycloid scales, including the maxillary. Gill-rakers long and slender, 16 on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth spines longest, $\frac{2}{5}$ length of head, nearly as long as longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral slightly shorter, nearly reaching anus. Second and third anal spines equal, $\frac{2}{7}$ length of head, $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales ciliated. Yellowish, with small red spots or undulous longitudinal lines; pectoral yellow; soft dorsal, anal, and caudal edged with yellow.

Total length 225 millim. Grows to 350 millim.

Coast of New South Wales.

| | | |
|---|---|---|
| *a*. Hgr. | Sydney. | G. Krefft, Esq. [P]. |

### 56. Epinephelus drummondhayi.

Epinephelus drummond-hayi, *Goode & Bean, Proc. U.S. Nat. Mus.* i. 1878, p. 174; *Jord. & Gilb. Syn. Fish. N. Am.* p. 540 (1882); *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 388; *Jord. &*

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*Eigenm. Proc. U.S. Nat. Mus.* x. 1887, p. 269, *and Bull. U.S. Fish Comm.* viii. 1890, p. 356.

D. XI 16. A. III 9. Sc. 125 $\frac{30}{57}$.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body nearly equal to length of head, about 3 times in total length. Snout longer than diameter of eye, which is 5½ times in length of head and equals interorbital width; lower jaw projecting; maxillary extending to below centre of eye; præopercle not produced at the angle, which is armed with slightly enlarged serræ. Fourth dorsal spine longest. Second anal spine shorter than third. Caudal truncate in the adult. Scales ciliated. Dark reddish brown, profusely covered with pearly-white stellate spots; fins not dark-edged.

Total length 400 millim.

South-eastern coast of the United States; Bermuda.

### 57. **Epinephelus niveatus.** (PLATE III. fig. B.)

Serranus niveatus, *Cuv. & Val.* ii. p. 380 (1828); *Casteln. Anim. Amér. Sud, Poiss.* p. 2, pl. i. fig. 2 (1855); *Günth.* i. p. 130 (1859); *Poey, Repert. Cuba*, i. 1866, p. 202.

Serranus margaritifer, *Günth. t. c.* p. 131.

Serranus conspersus, *Poey, Mem. Cuba*, ii. p. 139 (1860).

Hyporthrodus flavicauda, *Gill, Proc. Ac. Philad.* 1861, p. 98; *Cope, Proc. Ac. Philad.* 1870, p. 119.

Epinephelus flavolimbatus, *Poey, Repert. Cuba*, i. 1867, p. 183; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 357.

Epinephelus niveatus, *Poey, Repert. Cuba*, ii. 1868, p. 286; *Jord. & Gilb. Syn. Fish. N. Am.* p. 541 (1882); *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 386; *Jord. & Everm. Proc. U.S. Nat. Mus.* ix. 1886, p. 475; *Jord. & Eigenm. l. c.*

D. XI (rarely X) 14–15. A. III 9. Sc. 115–120 $\frac{17-20}{48-52}$; l. l. 67–75.

Teeth in narrow bands, in two series on the sides of the mandible; canines rather strong. Depth of body nearly equal to length of head, 2½ to 3 times in total length. Snout a little longer than diameter of eye, which is 4½ to 5½ times in length of head and equals interorbital width; posterior nostril large; lower jaw projecting; maxillary extending to below centre or posterior border of eye; præopercular border angular, with strong serræ at the angle, the two or three lower of which point downwards; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap obtusely pointed, its upper border very convex; head nearly entirely covered with cycloid scales; a band of small scales on the maxillary. Gill-rakers long, the longest at least as long as the gill-fringes, 15 on lower part of anterior arch. Dorsal originating a little in advance of base of pectoral; third and fourth spines longest, ⅓ to ⅖ length of head, as long as or a little shorter than longest soft rays. Pectoral ⅗ to ⅔ length of head. Ventral as long or a little shorter, sometimes reaching anus. Second anal spine as long as or a little shorter than third, ⅕ to ⅓



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length of head, $\frac{1}{2}$ to $\frac{2}{3}$ length of longest soft rays. Caudal rounded in the young, truncate in the adult. Scales mostly ciliated. Young brown, with round bluish-white spots on the body, disposed regularly in 4 longitudinal and 6 vertical series; pectoral and caudal yellowish, the other fins dark brown or blackish; a blackish blotch may be present on the caudal peduncle, behind the dorsal. Adult pale reddish brown, without spots; the spinous dorsal broadly edged with bright yellow.

Total length 850 millim.

Atlantic coasts of America, from the Southern United States to Brazil.

| | | |
|---|---|---|
| *a*. Ad. | Jamaica. | Intern. Fisher. Exhib. 1883. |
| *b*. Yg. | Id. of Grenada. | |
| *c*. Yg. | Rio Grande do Sul. | Dr. H. v. Ihering [C.]. |
| *d*. Yg. | S. America. | Sir R. Schomburgk [P.]. (Type of *S. margaritifer*.) |

### 58. Epinephelus septemfasciatus.

Perca 7-fasciata, *Thunberg, Vetensk. Acad. Handl. Stockholm*, xiv. 1793, p. 56, pl. i.

Plectropoma susuki, *Cuv. & Val.* ii. p. 404 (1828); *Temm. & Schleg. Faun. Japon., Pisc.* p. 11, pl. iv. fig. 1 (1844); *Richards. Rep. Ichth. China*, p. 230 (1846); *Günth.* i. p. 160 (1859), *and Proc. Zool. Soc.* 1867, p. 100; *Macleay, Proc. Linn. Soc. N. S. W.* v. 1886, p. 323.

Serranus octocinctus, *Temm. & Schleg. l. c.* p. 7, pl. iv. A. fig. 2; *Bleek. Verh. Batav. Gen.* xxv. 1853, *Ichth. Jap.* p. 24; *Kaup, Nederl. Tijdschr. Dierk.* i. 1863, p. 20; *Günth. Zool. Challenger, Shore Fish.* p. 63 (1880).

Serranus mystacinus, *Poey, Mem. Cuba*, i. 1851, p. 52, pl. x. fig. 1; *Günth.* i. p. 109; *Poey, Repert. Cuba*, ii. 1866, p. 154.

Schistorus mystacinus, *Poey, Repert. Cuba*, ii. 1868, p. 287.

Epinephelus susuki, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1873, p. 138; *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 384.

Serranus susuki, *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 230.

Epinephelus mystacinus, *Jord. & Swain, l. c.* p. 383; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 360.

D. XI 13–15. A. III 9. Sc. 115–130 $\frac{15-18}{46-55}$; l. l. 70–76.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body $2\frac{1}{2}$ to 3 times in total length, length of head $2\frac{1}{2}$ to $2\frac{3}{4}$ times. Snout as long as or slightly longer than diameter of eye, which is 4 to 5 times in length of head; interorbital width 5 to 6 times in length of head; nostrils close together, posterior very large in the adult; lower jaw feebly projecting; maxillary extending to below posterior third or posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præopercular border forming nearly a right angle, with enlarged serræ at the angle and frequently one to four strong serræ directed forwards on the lower border near the angle; middle opercular spine nearer lower than upper, lower not extending further back

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than upper; opercular flap obtusely pointed, the upper border very convex; head nearly entirely covered with cycloid scales; maxillary naked or with a few scales. Gill-rakers rather long, 14 or 15 on lower part of anterior arch. Dorsal originating above base of pectoral; third to fifth spines longest, $\frac{2}{5}$ to $\frac{1}{2}$ length of head, and as long as longest soft rays; last spine shorter, $\frac{1}{3}$ to $\frac{2}{5}$ length of head. Pectoral $\frac{2}{3}$ length of head. Ventral nearly as long as pectoral, reaching anus. Third anal spine longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, and much shorter than soft rays. Caudal rounded. Scales mostly ciliated. Grey or brown, with 8 or 9 darker vertical bands, the last on caudal peduncle, almost black above; a black line bordering the maxillary groove above; ventral, soft dorsal, and anal fins dark brown or blackish.

Total length 295 millim. Grows to 900 millim.

Tropical Atlantic, Indian, and Western Pacific Ocean.

| | | |
|---|---|---|
| *a*. Yg. | S. America. | Sir R. Schomburgk [P.]. |
| *b*. Hgr., skin. | Mauritius. | |
| *c–d*. Yg. | Yokohama. | H.M.S. 'Challenger.' |
| *e–f*. Hgr. | Port Jackson. | G. Krefft, Esq. [P.]. |

### 59. Epinephelus rivulatus *.

Serranus rivilatus, *Cuv. & Val.* vi. p. 515 (1830).

D. X 16. A. III 8. Sc. 90 $\frac{11}{33}$; l. l. 54.

Teeth in narrow bands, in two series on the sides of the mandible; canines small. Depth of body equal to length of head, $2\frac{3}{4}$ times in total length. Snout a little shorter than diameter of eye, which is 4 times in length of head; interorbital width 6 times in length of head; lower jaw projecting; maxillary extending a little beyond vertical of posterior border of eye, the width of its distal extremity $\frac{1}{2}$ diameter of eye; præopercular border forming a right angle, the serræ at the angle enlarged, five in number; opercular spines equidistant, lower extending further back than upper; opercular flap pointed, upper border nearly straight; head nearly entirely covered with cycloid scales. Gill-rakers as long as gill-fringes, 14 on lower part of anterior arch. Dorsal originating above base of pectoral; fourth, fifth, and sixth spines longest, $\frac{2}{5}$ length of head; last spine as long as second, $\frac{1}{3}$ length of head; soft rays as long as longest spines. Pectoral nearly $\frac{3}{4}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, as long as second dorsal spine and $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales ciliated. Brown, body speckled all over with bluish white, each speck occupying the centre of a scale; a blackish line along the base of the dorsal; three or four undulous brown lines on the cheek, below the eye.

Total length 170 millim.

Bourbon.

* Described from the type specimen (Paris Mus. no. 7347).



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### 60. Epinephelus analogus.

Epinephelus analogus, *Gill, Proc. Ac. Philad.* 1863, p. 163; *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 393; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 354.
Serranus courtadei, *Bocourt, Ann. Sc. Nat.* (5) x. 1868, p. 222; *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 80, pl. ii. fig. 3 (1877).
Serranus analogus, *Günth. Tr. Zool. Soc.* vi. 1869, p. 410; *Steind. Sitzb. Ak. Wien*, lxxii. 1876, p. 555.

D. X 17–18. A. III 8. Sc. 110–120 $\frac{12-15}{38-42}$; l. l. 70–73.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body 3 to $3\frac{1}{4}$ times in total length, length of head $2\frac{3}{5}$ to 3 times. Snout a little longer than diameter of eye, which is 5 to $5\frac{1}{2}$ times in length of head; interorbital width $5\frac{1}{2}$ to $6\frac{1}{2}$ times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præopercle with three to five strongly enlarged teeth at the angle; middle opercular spine nearer lower than upper, lower opercular spine a little further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales. Gill-rakers nearly as long as gill-fringes, 17 or 18 on lower part of anterior arch. Dorsal originating above base of pectoral; third, fourth, and fifth spines longest, nearly $\frac{2}{3}$ length of head; last spine as long as second, $\frac{2}{7}$ to $\frac{1}{3}$ length of head; soft rays as long as longest spines. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral a little shorter, usually not reaching anus. Third anal spine longest, as long as second dorsal spine and considerably shorter than soft rays. Caudal rounded. Scales mostly cycloid above lateral line. Brown, with large round dark spots and more or less distinct vertical bars, four or five in number.

Total length 400 millim.

Pacific coast of Central America.

| | | |
|---|---|---|
| *a–c.* Hgr. | Las Peñas, Jalisco. | Dr. A. C. Buller [C.]. |
| *d–e.* Ad. | Panama. | Capt. J. C. Dow [P.]. |
| *f.* Yg. | Pacific Coast of C. America. | Capt. J. C. Dow [P.]. |

### 61. Epinephelus ascensionis.

Trachinus adscensionis, *Osbeck, Voy. China*, ii. p. 96 (1771); *Cuv. & Val.* vi. p. 517 (1830).
Perca maculata, *Bloch, Ausl. Fische*, vi. p. 92, pl. cccxiii. (1792).
Trachinus osbeck, *Lacép. Poiss.* ii. p. 364 (1800).
Sparus atlanticus, *Lacép. op. cit.* iv. p. 156, pl. clvii. fig. 1 (1802).
Serranus aspersus, *Jenyns, Zool. Beagle, Fish.* p. 6 (1842).
Serranus impetiginosus, *Müll. & Trosch. in Schomb. Hist. Barbad.* p. 665 (1847); *Günth.* i. p. 142 (1859).
Serranus trimaculatus, part., *Günth. t. c.* p. 109.
Serranus ura (*non C. & V.*), *Günth. t. c.* p. 147.
Serranus capreolus, *Poey, Mem. Cuba*, ii. p. 145 (1860); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 87, pl. iii. fig. 1 (1877).

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Serranus maculatus, *var.* impetiginosus, *Peters, Mon. Berl. Ac.* 1865, p. 110.
Epinephelus impetiginosus, *Poey, Repert. Cuba*, i. p. 201 (1866); *Jord. & Gilb. Syn. Fish. N. Am.* p. 973 (1882).
Serranus varius, *Bocourt, Ann. Sc. Nat.* (5) x. 1868, p. 222.
Epinephelus capreolus, *Jord. & Gilb. op. cit.* p. 539.
Serranus clathratus (*non Stdr.*), *Goode, Fish. & Fisher. Industr. U.S.* i. pl. clxvi. (1884).
Epinephelus ascensionis, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 391; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 354.
Epinephelus aspersus, *Jord. & Eigenm. l. c.* p. 358.

D. XI 16–17. A. III 8. Sc. 90–110 $\frac{9-13}{35-42}$; l.l. 55–60.

Teeth in rather broad bands in the adult, in three or four series on the sides of the mandible; canines moderate. Depth of body 3 to $3\frac{1}{2}$ times in total length, length of head $2\frac{3}{4}$ to 3 times. Snout longer than diameter of eye, which is $4\frac{1}{2}$ to 6 times in length of head; interorbital width 6 to 7 times in length of head; lower jaw strongly projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity $\frac{1}{2}$ to $\frac{4}{5}$ diameter of eye; præopercular border rounded, finely serrated behind, the serræ slightly enlarged at the angle; opercular spine equidistant, lower further back than upper; opercular flap pointed; head covered with cycloid scales; maxillary naked. Gill-rakers moderate, 15 to 18 on lower part of anterior arch. Dorsal originating above base of pectoral; fourth or fifth or third to fifth spines longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, longer than last spine, nearly as long as longest soft rays. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Ventral shorter, reaching anus or not quite so far. Second anal spine as long as or slightly longer than third, $\frac{1}{4}$ to $\frac{1}{3}$ length of head, $\frac{3}{5}$ to $\frac{2}{3}$ length of longest soft rays. Caudal rounded, subtruncate in the adult. Scales mostly ciliated. Olive or brownish above, with orange or reddish-brown spots, which are more numerous in the adult than in the young; usually some whitish blotches scattered on the sides of the body and on the lower surface of head and breast, and four or five dark blotches on the back, the largest below the last dorsal spines, the last on the caudal peduncle, behind the fin; fins spotted like the body, with a fine whitish edge.

Total length 400 millim.

Tropical Atlantic, northwards to Florida and Bermuda.

| | | |
|---|---|---|
| *a.* Ad., stffd. | St. Helena. | Gen. Hardwicke [P.]. |
| *b–d.* Ad. & yg. | St. Helena. | J. C. Melliss, Esq. [P]. |
| *e–f.* Ad. | Ascension. | H.M.S. 'Challenger.' |
| *g–h.* Hgr. | Bahia. | Dr. Wucherer [C]. |
| *i.* Ad. | Cempoala, Vera Cruz. | Mexico Museum [E.]. |
| *k.* Yg. | Caribbean Sea. | Zoological Society. |
| *l.* Hgr., skin. | Trinidad. | Sir J. Richardson [P.]. |
| *m.* Hgr., skin. | West Indies. | Mr. Scrivener [C.]. |
| *n.* Ad. | Bermuda. | Smithsonian Institution. |
| *o, p.* Hgr., skins. | Cape Seas. | Sir A. Smith [P.]. |

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### 62. Epinephelus labriformis.

Serranus labriformis, *Jenyns, Zool. Beagle, Fish.* p. 8, pl. iii. (1840); *Günth.* i. p. 152 (1859).

Epinephelus sellicauda, *Gill, Proc. Ac. Philad.* 1862, p. 250; *Jord. & Gilb. Proc. U.S. Nat. Mus.* v. 1882, p. 360; *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 385.

Serranus sellicauda, *Günth. Tr. Zool. Soc.* vi. 1869, p. 409.

Epinephelus ordinatus, *Cope, Tr. Amer. Philos. Soc.* (2) xiv. 1871, p. 466.

Epinephelus labriformis, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 356.

D. XI 15–17. A. III 8. Sc. 90–100 $\frac{9-10}{40}$; l. l. 55–57.

Teeth in moderately broad bands; canines moderate. Depth of body 3 times in total length, length of head $2\frac{2}{3}$ to 3 times. Snout as long as or a little longer than diameter of eye, which is $3\frac{1}{2}$ to 5 times in length of head; interorbital width 7 or 8 times in length of head; lower jaw feebly projecting; maxillary extending to below posterior border of eye or a little beyond; præopercular border rounded, with slightly enlarged serræ at the angle; middle opercular spine nearer lower than upper, lower further back than upper; head covered with cycloid scales; maxillary naked. Gill-rakers moderate, 14 to 16 on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth spines longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, considerably longer than last spine, as long as longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral shorter, reaching anus or not quite so far. Second anal spine as long as or longer than third, $\frac{2}{3}$ to $\frac{3}{4}$ length of longest soft rays. Caudal rounded, subtruncate in the adult. Scales mostly ciliated. Dark brown, with roundish pale blotches; usually a blackish blotch on caudal peduncle behind dorsal fin; fins blackish at the end, with a fine whitish edge.

Grows to 330 millim.

Pacific coast of Tropical America, from Lower California to the Galapagos Islands.

| | | |
|---|---|---|
| *a*. Yg. | Id. of Cordova, Nicaragua. | J. W. Skinner, Esq. [P.]. |
| *b*. Yg. | Pacific Coast of Panama. | P. L. Sclater, Esq. [P.]. |

### 63. Epinephelus awoara.

Serranus awoara, *Temm. & Schleg. Faun. Japon., Pisc.* p. 9, pl. iii. fig. 2 (1844); *Richards. Rep. Ichth. China*, p. 231 (1846); *Günth.* i. p. 150 (1859); *Kner, Novara, Fische*, p. 26 (1865); *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 231.

Epinephelus awoara, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1873, p. 137, *and Atl. Ichth.* vii. p. 59 (1876).

D. XI 16–18. A. III 8. Sc. 100–110 $\frac{12}{40}$; l. l. 50–55.

Teeth in moderately broad bands, in three series on the sides of the mandible; canines small. Depth of body 3 to $3\frac{1}{2}$ times in total length, length of head $2\frac{2}{3}$ to 3 times; snout longer than

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diameter of eye, which is $5\frac{1}{2}$ to 7 times in length of head and less than interorbital width in the adult; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity at least $\frac{2}{3}$ diameter of eye (in the adult); præopercular border forming an obtuse angle, finely serrated, the serræ slightly enlarged at the angle; opercular spines equidistant, lower further back than upper; opercular flap pointed; head covered with cycloid scales; end of snout and maxillary naked. Dorsal originating above base of pectoral; third or fourth spine longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, a little shorter than longest soft rays, which are the anterior. Pectoral $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, $\frac{1}{4}$ to $\frac{2}{7}$ length of head, $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales mostly ciliated. Grey, dotted with yellow on the head and body; fins edged with yellow.

Total length 380 millim.

Seas of China and Japan; Singapore.

*a*. Ad., skin. China. J. R. Reeves, Esq. [P.].

### 64. Epinephelus rhyncholepis.

Serranus rhyncholepis, *Bleek. Nat. Tijdschr. Nederl. Ind.* iii. 1852, p. 749; *Günth.* i. p. 105 (1859).

Epinephelus rhyncholepis, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 107, *and Atl. Ichth.* vii. p. 62, pl. cclxxxvi. fig. 2 (1876).

D. XI 17. A. III 8. Sc. 85–90 $\frac{12}{43}$.

Depth of body 3 to $3\frac{1}{6}$ times in total length, length of head $2\frac{3}{4}$ to 3 times. Upper profile of head convex; snout hardly as long as diameter of eye, which is about $\frac{1}{4}$ length of head and nearly double interorbital width; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye, the width of its distal extremity about $\frac{3}{5}$ diameter of eye; præopercular border angular, with somewhat enlarged serræ at the angle; opercular spines subequidistant, lower further back than upper; opercular flap pointed, upper border nearly straight; maxillary naked. Third or fourth dorsal spine longest, $\frac{1}{2}$ length of head, much longer than last spine, and as long as longest soft rays. Pectoral $\frac{2}{7}$ length of head; ventral much shorter. Second anal spine as long as third, or a little longer, about $\frac{1}{3}$ length of head. Caudal rounded. Scales ciliated. Brown, each scale on the body and base of fins with a white dot; vertical fins brown, pectorals and ventrals orange.

Total length 300 millim.

Coasts of Celebes and Timor.

### 65. Epinephelus gigas.

Perca gigas, *Brünnich, Ichth. Massil.* p. 65 (1768).

Holocentrus gigas, *Bl. Schn. Syst. Ichth.* p. 322 (1801).

Holocentrus merou, *Lacép. Poiss.* iv. p. 376 (1802).

Serranus gigas, *Geoffr. Mém. du Mus.* xi. 1824, p. 443, pl. xxi.;

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*Risso, Eur. Mér.* iii. p. 373 (1826); *Cuv. & Val.* ii. p. 270, pl. xxxiii. (1828); *Bory, Expéd. Morée*, iii. *Poiss.* pl. xvi. fig. 1 (1832); *Guichen. Explor. Sc. Alg., Poiss.* p. 35 (1850); *Capello, Jorn. Sc. Lisb.* i. 1867, p. 244; *Canestr. Faun. Ital., Pesci*, p. 76 (1874); *Steind. Sitzb. Ak. Wien*, lxxiv. i. 1876, p. 175.

Serranus mentzelii, *Cuv. & Val. t. c.* p. 291; *Günth.* i. p. 140 (1859).

Serranus dichropterus, part., *Cuv. & Val. t. c.* p. 293.

Serranus marginatus (*non C. & V.*), *Lowe, Proc. Zool. Soc.* 1833, p. 142.

Serranus fimbriatus, *Lowe, Tr. Cambr. Philos. Soc.* vi. 1836, p. 195; *Val. in Webb & Berthel. Iles Canar., Poiss.* p. 8 (1843); *Capello, Jorn. Sc. Lisb.* i. 1867, p. 246.

Serranus gigas, part., *Yarrell, Brit. Fish.* i. p. 15, fig. (1836); *Günth. t. c.* p. 132; *Steind. Sitzb. Ak. Wien*, lvi. i. 1867, p. 613; *Day, Fish. Gr. Brit.* p. 16 (1880).

Cerna gigas, *Bonap. Icon. Faun. Ital.* iii. *Introd.* (1841); *Costa, Faun. Nap.* p. i, pl. vii. bis (1850); *Doderl. Giorn. Sc. Palermo*, xv. 1882, p. 177, pl. i. fig. 1.

Serranus ongus, part., *Günth. t. c.* p. 142.

Epinephelus brachysomus, *Cope, Tr. Amer. Philos. Soc.* (2) xiv. 1871, p. 466.

Epinephelus gigas, *Moreau, Poiss. France*, ii. p. 368 (1881): *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 388; *Doderl. Man. Ittiol. Medit.* iv. p. 61 (1889); *Jord. & Eugenm. Bull. U.S. Fish. Comm.* viii. 1890, p. 359.

D. XI 14–16. A. III 8. Sc. 100–120 $\frac{12-17}{42-55}$; l. l. 60–80.

Teeth in rather narrow bands in the young, in broad bands in the adult; canines small, disappearing in old specimens. Depth of body nearly equal to length of head, 2½ to 3 times in total length. Snout longer than diameter of eye, which is 5 (young) to 8 times in length of head; interorbital width 4½ (adult) to 6 times (young) in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity at least ⅔ diameter of eye; præopercular border rounded or obtusely angular, the angle armed with enlarged serræ; middle opercular spine a little nearer lower than upper, lower further back than upper; opercular flap pointed; head covered with cycloid scales; maxillary naked. Gill-rakers moderately elongate, 15 or 16 on lower part of anterior arch. Dorsal originating above base of pectoral; fourth or fifth spine longest, about ⅔ to nearly ½ length of head, as long as or a little longer than longest soft rays. Pectoral ½ to ⅔ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, ⅓ to ½ length of head, ½ to ⅔ length of longest soft rays. Caudal rounded, subtruncate in old specimens. Scales mostly cycloid above lateral line, nearly all cycloid in old specimens. Adult uniform dark brown; young often with greyish, yellow, or red irregular spots or marblings, and with the fins edged with whitish.

Total length 900 millim.

Mediterranean; Atlantic, from the coasts of Portugal and Africa to Brazil; South-east coast of Africa.

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| | | |
|---|---|---|
| *a*. Ad., stffd. | Coast of Portugal. | Lisbon Museum. |
| *b*, *c*, *d*. Ad. & yg. | Madeira. | J. Y. Johnson, Esq. [P.]. |
| *e*. Hgr., stffd. | Madeira. | Rev. R. T. Lowe [P.]. |
| *f*. Yg. | Lanzarote, Canary Ids. | Rev. R. T. Lowe [P.]. |
| *g*. Yg. | Cape Verd Ids. | Rev. R. T. Lowe [P.]. |
| *h*. Yg. | Rio Janeiro. | Commander Knocker [P.]. |
| *i*. Yg. | Rio Janeiro. | Capt. Milner [P.]. |
| *k*–*l*. Yg. | Bahia. | |
| *m*. Yg. | Bahia? | Haslar Collection. |
| *n*. Yg. | Brazil. | Prof. Moesch [E.]. |
| *o*. Ad., stffd. | Cape of Good Hope. | Sir A. Smith [P.]. |
| *p*. Hgr. | Port Natal. | Mr. T. Ayres [C.]. |

### 66. **Epinephelus cernioides.**

Serranus cernioides, *Capello*, *Jorn. Sc. Lisb.* i. 1867, pp. 156 & 244, pl. iv. fig. 1.

D. XI 13. A. III 8. Sc. 112 $\frac{21}{59}$.

Teeth in broad bands; canines small. Depth of body $3\frac{2}{3}$ times in total length; length of head 3 times. Snout longer than diameter of eye, which is nearly 7 times in length of head; maxillary extending to below posterior border of eye; præopercle somewhat produced at the angle, which is armed with enlarged serræ; subopercle and interopercle serrated; opercular spines strong, proceeding from distinct ridges, middle spine a little nearer lower than upper, lower a little further back than upper; opercular flap pointed; head covered with ctenoid scales, including the maxillary. Dorsal originating above axilla; third spine longest, $\frac{1}{3}$ length of head, a little longer than longest soft rays; last spine half as long as longest soft rays. Pectoral $\frac{2}{5}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, $\frac{1}{5}$ length of head, $\frac{1}{2}$ length of longest soft rays. Caudal rounded. Scales all ctenoid. Uniform dark brown.

Total length one metre or more.

Coast of Portugal.

### 67. **Epinephelus jayakari.** (PLATE VIII.)

Serranus jayakari, *Bouleng. Proc. Zool. Soc.* 1889, p. 237.

D. XI 16–17. A. III 8. Sc. 140–150 $\frac{18-20}{45-50}$; l. l. 75–85.

Teeth forming rather broad bands, in three or four series on the sides of the mandible in the adult; canines small, disappearing in old specimens. Depth of body nearly equal to length of head, $2\frac{3}{4}$ to $3\frac{1}{3}$ times in total length; snout longer than diameter of eye, which is 5 (young) to $6\frac{1}{2}$ times in length of head; interorbital width 4 to 5 times in length of head; nostrils close together in the adult, posterior very large; lower jaw projecting; maxillary extending to below centre or posterior border of eye, the width of its distal extremity $\frac{2}{3}$ to $\frac{3}{4}$ diameter of eye; præopercle finely serrated posteriorly, the

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serræ slightly stronger at the angle, which is rounded and not or but slightly produced; middle opercular spine nearer lower than upper, lower further back than upper; opercular flap pointed; head entirely covered with cycloid scales, including the maxillary. Gill-rakers long, 15 on lower part of anterior arch. Dorsal originating above base of pectoral; second and third or third and fourth spines longest, $\frac{1}{3}$ to $\frac{1}{2}$ length of head, as long as or longer than longest soft rays. Pectoral $\frac{3}{5}$ length of head. Ventral slightly shorter, not reaching anus. Second anal spine a little shorter than third, $\frac{1}{3}$ to $\frac{1}{4}$ length of head, $\frac{1}{3}$ to $\frac{2}{5}$ length of longest soft rays. Caudal truncate or slightly emarginate. Scales mostly ciliated. Adult uniform brown, lighter inferiorly; young blackish brown, with irregularly scattered large roundish light spots; fins uniform blackish brown.

Total length 900 millim.

Indian Ocean.

| | | | |
|---|---|---|---|
| *a*. Ad., stffd. | Muscat. | A. S. G. Jayakar, Esq. [P.]. | (Types.) |
| *b*, *c*. Ad., skins. | Muscat. | A. S. G. Jayakar, Esq. [P.]. | (Types.) |
| *d*. Hgr. | Muscat. | A. S. G. Jayakar, Esq. [P.]. | |
| *e*, *f*, *g*. Ad., stffd. | Mauritius. | M. V. de Robillard [C.]. | |
| *h*. Yg. | W. Australia. | Capt. Beckett [P.]. | |

### 68. **Epinephelus albopunctulatus.** (PLATE IX.)

D. XI 16. A. III 8. Sc. 120 $\frac{16}{50}$; l. l. 75.

Teeth in moderately broad bands, in three series on the sides of the mandible; canines moderate. Depth of body nearly equal to length of head, 3 times in total length. Snout a little longer than diameter of eye, which is 5 times in length of head; interorbital width 6 times in length of head; lower jaw projecting; maxillary extending slightly beyond vertical of posterior border of eye, the width of its distal extremity $\frac{2}{3}$ diameter of eye; opercular border rounded, finely serrated, the serræ somewhat enlarged at the angle; opercular spines equidistant, lower much further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers rather long, the longest quite as long as gill-fringes, 15 on lower part of anterior arch. Dorsal originating somewhat in advance of base of pectoral; second spine much longer than the others, $\frac{1}{2}$ length of head, the following subequal, $\frac{1}{3}$ length of head and shorter than the soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral a little shorter, nearly reaching anus. Second and third anal spines equal, $\frac{1}{3}$ length of head, $\frac{2}{3}$ length of longest soft rays. Caudal truncate. Scales mostly ciliated. Brown, dotted with white, each dot occupying the base of a scale; soft dorsal, anal, and caudal fins with a narrow pale margin; spinous dorsal with a black margin.

Total length 210 millim.

Polynesia.

| | | |
|---|---|---|
| *a*. Hgr. | Nukahiva, Marquesas Ids. | Museum Godeffroy. |

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### 69. Epinephelus striatus.

Anthias striatus, *Bloch, Ausl. Fische*, vi. p. 125, pl. cccxxiv. (1792).
Anthias cherna, *Bl. Schn. Syst. Ichth.* p. 310 (1801).
Sparus chrysomelanurus, *Lacép. Poiss.* iv. p. 160 (1802).
Serranus striatus, *Cuv. & Val.* ii. p. 288 (1828); *Guichen. in R. de la Sagra, Hist. Cuba, Zool., Poiss.* p. 12 (1853); *Poey, Repert. Cuba*, i. 1867, p. 198; *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 76 (1877).
Serranus striatus, part., *Günth.* i. p. 110 (1859).
Epinephelus striatus, *Gill, Proc. Ac. Philad.* 1865, p. 105; *Poey, Repert. Cuba*, ii. 1868, p. 285; *Goode, Bull. U.S. Nat. Mus.* no. 5, 1876, p. 57; *Jord. & Gilb. Syn. Fish. N. Am.* p. 918 (1882); *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 384; *Jord. & Eigenm. Bull. U.S. Fish. Comm.* viii. 1890, p. 356.

D. XI. 16–17. A. III 8. Sc. 110–125 $\frac{13-18}{45-55}$; l. l. 55–65.

Teeth in moderately broad bands, in three or four series on the sides of the mandible in the adult; canines moderate. Depth of body nearly equal to length of head, $2\frac{3}{4}$ to $3\frac{1}{3}$ times in total length. Snout longer than diameter of eye, which is 5 to 6 times in length of head; interorbital width 6 to 7 times in length of head; posterior nostril, in the adult, large, vertically elliptic; lower jaw feebly projecting; maxillary extending to below posterior border of eye, the width of its distal extremity at least $\frac{2}{3}$ diameter of eye; præopercular border rounded or obtusely angular, finely serrated behind, the serræ slightly enlarged at the angle; opercular spines nearly equidistant, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary with a band of small scales. Gill-rakers moderately elongate, 15 to 17 on lower part of anterior arch. Third, or second and third dorsal spines longest, $\frac{1}{3}$ to $\frac{1}{2}$ length of head, at least as long as longest soft rays; the fin rather deeply notched. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Ventral shorter, sometimes reaching anus. Second anal spine as long as or a little shorter than third, $\frac{1}{3}$ to $\frac{2}{7}$ length of head, $\frac{1}{2}$ to $\frac{3}{5}$ length of longest soft rays. Caudal rounded in the young, truncate in the adult. Scales mostly ciliated. Grey or brown, with four or five more or less distinct dark cross-bands on the body, and a black quadrangular spot on the caudal peduncle, behind the dorsal; a dark band ascending from the eye to in front of the dorsal, where it joins its fellow; a pair of narrower bands between the latter, usually confluent in front and behind; usually a few blackish dots around the eye.

Total length 720 millim.; grows to 1200 millim.

Gulf of Mexico and Caribbean Sea, northwards to Bermuda.

| | | |
|---|---|---|
| *a*. Ad. | Bermuda. | J. M. Jones, Esq. [C.]. |
| *b*. Yg. | Bermuda. | Smithsonian Institution [E.]. |
| *c*. Hgr., skin. | Cuba. | Prof. Poey [C.]. |
| *d*. Ad. | Jamaica. | Intern. Fisheries Exhib. 1883. |
| *e*. Ad. | Jamaica. | Institute of Jamaica [P.]. |
| *f*, *g*, *h*. Yg., skins. | Jamaica. | Parnell Collection. |
| *i*. Yg. | St. Croix. | |

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|---|---|
| *k, l.* Yg. | West Indies. |
| *m, n.* Ad., stffd. | West Indies. |
| *o.* Yg., skin. | West Indies. |
| *p.* Yg., skel. | West Indies. |

## 70. Epinephelus corallicola.

Serranus corallicola, *Cuv. & Val.* ii. p. 336 (1828); *Day, Fish. Ind.* p. 20 (1875), *and Faun. Ind., Fish.* i. p. 451 (1889).
Serranus miliaris, *Cuv. & Val.* vi. p. 520* (1830).
Serranus macrospilos, *Bleek. Nat. Tijdschr. Nederl. Ind.* ix. 1855, p. 499; *Günth.* i. p. 149 (1859).
Serranus altivelioides, *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 38; *Günth. t. c.* p. 127; *Kner, Novara, Fische*, p. 23 (1865).
Epinephelus altivelioides, *Bleek. Nederl. Tijdschr. Dierk.* ii. 1865, p. 277.
Epinephelus macrospilus, *Bleek. l. c., Verh. Ak. Amst.* xiv. no. 2, 1873, p. 81, *and Atl. Ichth.* vii. p. 52, pl. ccxc. fig. 2 (1876).
Epinephelus corallicola, *Bleek. l. c.* 1873, p. 83, *and Atl.* p. 53, pl. cccviii. fig. 1.
Serranus howlandi, *Günth. Fische Südsee*, p. 8, pl. ix. fig. B (1873).

D. XI 15–17. A. III 8. Sc. 90–110 $\frac{11-15}{35-45}$; l. l. 57–70.

Teeth in rather broad bands, in three or four series on the sides of the mandible; canines strong. Depth of body 3 to $3\frac{1}{2}$ times in length of head, length of head $2\frac{3}{5}$ to 3 times. Snout not or but slightly longer than diameter of eye, which is $4\frac{1}{2}$ to $5\frac{1}{2}$ times in length of head; interorbital width 6 to $7\frac{1}{2}$ times in length of head; nostrils close together; lower jaw projecting; maxillary extending to below posterior border of eye, or a little beyond, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{4}$ diameter of eye; præopercular border obtusely angular or rounded, posterior border finely serrated, the serræ slightly enlarged at the angle; opercular spines nearly equidistant, lower further back than upper; opercular flap pointed, its upper border nearly straight; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers rather short, 10 to 14 and some rudiments on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, considerably longer than the last, $\frac{2}{7}$ to $\frac{2}{5}$ length of head, as long as or a little shorter than longest soft rays. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second anal spine as long as or a little shorter than third, $\frac{1}{6}$ to $\frac{1}{3}$ length of longest soft rays. Caudal rounded. Scales cycloid above lateral line, ciliated on anterior lateral region. Pale brown, all over with round dark brown or black spots, smaller and more numerous the older the specimen; two or three more or less distinct large dark brown or black blotches on the dorsal line at the base of the fin, and another behind the latter on the caudal peduncle; pectoral and ventrals dark, usually blackish; all the fins with a narrow yellowish-white edge.

Total length 385 millim.

* Type, a very bad skin (Paris Mus. no. 7642), examined.

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Bay of Bengal, Malay Archipelago, Western Tropical Pacific.

| | | |
|---|---|---|
| *a*. Yg. | Malay Archipelago. | Dr. Bleeker. (As typical of *S. macrospilos*.) |
| *b*. Yg. | Manado, Celebes. | Dr. A. B. Meyer [C.]. |
| *c*. Hgr. | Pelew Ids. | Museum Godeffroy. |
| *d, e*. Ad. | Mortlock Ids., Carolines. | Museum Godeffroy. |
| *f, g, h, i, k*. Ad. & hgr. | Ponape, Carolines. | Museum Godeffroy. |
| *l*. Hgr. | Greenwich Id. | Museum Godeffroy. |
| *m*. Ad. | Howland Id. | Museum Godeffroy. (Type of *S. howlandi*.) |

## 71. Epinephelus morio.

Serranus morio, *Cuv. & Val.* ii. p. 285 (1828); *Günth.* i. p. 142 (1859); *Poey, Repert. Cuba*, i. 1865, p. 197; *Steind. Sitzb. Ak. Wien*, lxxiv. i. 1876, p. 175.

Serranus erythrogaster, *Dekay, N. Y. Faun., Fish.* p. 21, pl. xix. fig. 52 (1842); *Günth. t. c.* p. 133; *Holbr. Ichth. S. Carol.* 2nd ed. p. 29, pl. v. fig. 2 (1860).

Serranus striatus, part., *Günth. t. c.* p. 110.

Serranus remotus, *Poey, Mem. Cuba*, ii. p. 140 (1860).

Epinephelus morio, *Gill, Proc. Ac. Philad.* 1861, App. p. 30; *Poey, Repert. Cuba*, ii. 1868, p. 285; *Goode & Bean, Proc. U.S. Nat. Mus.* ii. 1879, p. 139; *Jord. & Gilb. Syn. Fish. N. Am.* p. 540 (1882); *Goode, Fish. & Fisher. Ind. U.S.* i. pl. clxiv. (1884); *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 381; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 361.

Epinephelus erythrogaster, *Gill, l. c.*

D. XI 16–17. A. III 9 (rarely 8). Sc. 130–140 $\frac{18\text{-}20}{60}$; l. l. 60–65.

Teeth in rather narrow bands, in two series on the sides of the mandible in the young (in three series in the adult?); canines small. Depth of body $2\frac{1}{2}$ to 3 times in total length, length of head $2\frac{3}{4}$ to 3 times. Snout longer than diameter of eye, which is 5 (young) to 7 times in length of head; interorbital width 6 to $7\frac{1}{2}$ times in length of head; lower jaw very slightly projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity $\frac{3}{5}$ to $\frac{3}{4}$ diameter of eye; præopercular border obtusely angular, the serræ slightly enlarged at the angle; upper opercular spine indistinct; head nearly entirely covered with cycloid scales; maxillary with a band of small scales. Gill-rakers moderately long, slender, 13 to 15 on lower part of anterior arch. Dorsal originating above axilla; second or second and third spines longest, $\frac{2}{3}$ to $\frac{3}{5}$ length of head, longer than longest soft rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second anal spine as long as or a little shorter than third, $\frac{1}{5}$ to $\frac{1}{4}$ length of head, $\frac{1}{2}$ to $\frac{3}{4}$ length of longest soft rays. Caudal truncate in the young, slightly emarginate in the adult. Scales mostly ciliated. Brown, lower parts flushed with orange-red; small blackish dots near the eye; dorsal and anal fins edged with blackish.

Total length 280 millim. Grows to a large size.

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Atlantic coasts of America, from Virginia to Brazil.

| | | |
|---|---|---|
| *a*. Hgr., skin. | Jamaica. | Parnell Collection. |
| *b*. Yg. | Puerto Cabello. | |
| *c–d*. Yg. | Brazil. | Prof. Moesch [E.]. |

### 72. Epinephelus nigritus.

Serranus nigritus, *Holbr. Ichth. N. Carol.* p. 173, pl. xxv. fig. 11 (1860); *Günth.* i. p. 134 (1859).
Epinephelus nigritus, *Gill, Proc. Ac. Philad.* 1861, App. p. 30; *Goode & Bean, Proc. U.S. Nat. Mus.* i. 1878, p. 182, and ii. 1879, p. 139; *Jord. & Gilb. Syn. Fish. N. Am.* p. 540 (1882); *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 380; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 361.
Centropristis merus, *Poey, Repert. Cuba*, ii. 1868, p. 288.
Cerna sicana, *Doderl. Giorn. Sc. Palermo*, xvi. 1882, p. 82.
Epinephelus sicanus, *Doderl. Man. Ittiol. Medit.* iv. p. 57 (1889).
Epinephelus merus, *Jord. & Eigenm. l. c.* p. 362.

D. X–XI 14–15. A. III 9. Sc. 86–115 $\frac{24}{52}$.

Teeth in broad bands; canines very small in the adult. Depth of body nearly equal to length of head, $2\frac{1}{3}$ to 3 times in total length. Eye very small, 6 to 8 times in length of head; interorbital region very broad, its width 4 to 6 times in length of head; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye; præopercular border rounded, with enlarged serræ at the angle, one of which usually points downwards; head covered with scales, including the maxillary. Gill-rakers very short and thick, the longest not twice as long as broad, 12 to 14 on lower part of anterior arch. Second or second and third dorsal spines longest, $\frac{1}{3}$ to $\frac{1}{2}$ length of head; the fin rather deeply notched. Second anal spine shorter than third, $\frac{1}{6}$ length of head. Caudal rounded. Scales ciliated. Dark brown or bluish black, uniform or with a few light spots; a black moustache along the edge of the maxillary.

Total length nearly 2 metres.

Atlantic coasts of America, from Florida to Brazil; Mediterranean.

### 73. Epinephelus fasciatus.

Perca fasciata, *Forsk. Descr. Anim.* p. 40 (1775).
Epinephelus marginalis, *Bloch, Ausl. Fische*, vii. p. 14, pl. cccxxviii. fig. 1 (1793).
Holocentrus erythræus, *Bl. Schn. Syst. Ichth.* p. 320 (1801).
Holocentrus forskael, *Lacép. Poiss.* iv. p. 277 (1802).
Holocentrus marginatus, *Lacép. l. c.* p. 384.
Holocentrus rosmarus, *Lacép. l. c.* p. 389, pl. vii. fig. 2.
Holocentrus oceanicus, *Lacép. l. c.* fig. 3.
Serranus marginalis, *Cuv. & Val.* ii. p. 301 (1828); *Richards. Rep. Ichth. China*, p. 233 (1846); *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 34; *Günth.* i. p. 135 (1859); *Kner, Novara, Fische*, p. 24 (1865); *Peters, Mon. Berl. Ac.* 1865, p. 109.
Serranus oceanicus, *Cuv. & Val. t. c.* p. 302; *Günth. t. c.* p. 109.
Serranus variolosus, *Cuv. & Val. t. c.* p. 354; *Günth. t. c.* p. 139.

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Serranus tsirimenara, *Temm. & Schleg. Faun. Japan., Pisc.* p. 7, pl. iv. A. fig. 3 (1844); *Günth. t. c.* p. 144; *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 232.

Epinephelus retouti, *Bleek. Versl. Akad. Amst.* (2) ii. 1868, p. 339, *and in Pollen & Van Dam, Faune Madag., Poiss.* p. 21, pl. xii. fig. 1 (1874); *Sauv. Hist. Madag., Poiss.* p. 69, pl. viii. fig. 2 (1891).

Serranus fasciatus, *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 681; *Günth. Fische Südsee*, p. 6, pl. vi. (1873); *Day, Fish. Ind.* p. 15, pl. iii. fig. 2 (1875); *Klunz. Fische Roth. Meer.* p. 6 (1884); *Day, Faun. Ind., Fish.* i. p. 449 (1889).

Epinephelus fasciatus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 119, *and Atl. Ichth.* vii. p. 66, pl. cccxxvi. fig. 3 (1876); *Sauv. l. c.* p. 78.

Serranus cruentus, *De Vis, Proc. Linn. Soc. N. S. W.* viii. 1883, p. 446.

D. XI* 16 (rarely 15 or 17). A. III 8. Sc. 100–120 $\frac{9-12}{36-42}$; l. l. 50–62.

Teeth forming rather narrow bands, in three series on the sides of the mandible. Depth of body 3 to $3\frac{1}{4}$ times in total length, length of head $2\frac{2}{3}$ to 3 times. Snout as long as or a little shorter than diameter of eye, which is 4 to 5 times in length of head; interorbital width 6 to 8 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or not quite so far, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye; præopercle rounded at the angle, which is armed with more or less enlarged serræ; opercular spines nearly equidistant, lower further back than upper; opercular flap pointed; head nearly entirely covered with cycloid scales; maxillary naked or with a few scales. Gill-rakers moderate, 15 or 16 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the third or fourth, which is $\frac{1}{3}$ to $\frac{2}{5}$ length of head, and not or but little longer than last spine; soft rays as long as or a little longer than longest spines. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral shorter, usually not reaching anus. Second and third anal spines equal, or second a little longer than third, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, and shorter than soft rays. Caudal subtruncate in the adult, rounded in the young. Scales ciliated. Red or pale brown, with or without more or less indistinct dark vertical bands, with or without bluish-white spots; membrane between dorsal spines broadly tipped with black.

Total length 330 millim.

Indian and Western Pacific Oceans, from the Red Sea and the East Coast of Africa to Japan and Polynesia.

| | | |
|---|---|---|
| *a.* Ad. | Red Sea. | Dr. Klunzinger [P.]. |
| *b.* Ad., skin. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *c.* Ad. | Seychelles. | Prof. E. P. Wright [C.]. |
| *d.* Ad. | Singapore. | Governor of Singapore [P.]. |
| *e–f.* Hgr. & yg. | China. | J. R. Reeves, Esq. [P.]. |
| *g.* Hgr., skin. | China. | J. R. Reeves, Esq. [P.]. |
| *h.* Hgr. | Loo Choo Ids. | Mr. Holst [C.]. |

* XII in one specimen.

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| | | |
|---|---|---|
| *i.* Ad., skin. | Japan. | |
| *k.* Ad. | Cebu, Philippines. | Dr. A. B. Meyer [C.]. |
| *l.* Ad. | Amboyna. | |
| *m.* Ad., skin. | Copang, Timor. | |
| *n, o.* Ad., skin. | Louisiade Archipelago. | H.M.S. 'Rattlesnake.' |
| *p, q.* Ad., skins. | Louisiade Archipelago. | J. Macgillivray, Esq. [C.]. |
| *r.* Yg. | Bonham Id. | Museum Godeffroy. |
| *s.* Ad., skin. | Darnley Id. | |
| *t–u.* Hgr. | Tahiti (?). | |
| *v.* Skeleton. | China. | |

## 74. Epinephelus nebulosus.

Serranus nebulosus, *Cuv. & Val.* ii. p. 313 (1828); *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 34; *Günth.* i. p. 148 (1859).
Serranus dichropterus, part., *Cuv. & Val. t. c.* p. 293.
Serranus moara, *Temm. & Schleg. Faun. Japon., Pisc.* p. 10, pl. iv. fig. 2 (1844); *Bleek. op. cit.* xxv. 1853, *Ichth. Jap.* p. 24; *Günth. t. c.* p. 133; *Kner, Novara, Fische*, p. 23 (1865); *Peters, Mon. Berl. Ac.* 1865, p. 103.
Epinephelus nebulosus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 117, *and Atl. Ichth.* vii. p. 66, pl. cccxxxix. fig. 3 (1876).

D. XI 15–17. A. III 8. Sc. 100–110 $\frac{10-11}{40}$; l. l. 60–65.

Teeth in moderately broad bands, in three series on the sides of the mandible; canines rather small. Depth of body 3 to $3\frac{1}{3}$ times in total length, length of head $2\frac{2}{3}$ to $2\frac{3}{4}$ times; snout longer than diameter of eye, which is $4\frac{1}{2}$ to 5 times in length of head; interorbital width 8 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or slightly beyond, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{4}$ diameter of eye; præopercular border angular, the serræ a little enlarged at the angle, which is rounded; opercular spines nearly equidistant, lower further back than upper; opercular flap pointed; head covered with cycloid scales; maxillary with some small scales. Gill-rakers rather short, 14 or 15 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the third, which is $\frac{1}{3}$ length of head, and a little shorter than longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second anal spine a little longer than third, $\frac{2}{7}$ to $\frac{1}{3}$ length of head, $\frac{2}{3}$ to $\frac{3}{4}$ length of longest soft rays. Caudal rounded. Scales mostly ciliated. Brownish grey, body marbled with darker.

Total length 340 millim.

Coasts of Japan and the Malay Archipelago.

| | | |
|---|---|---|
| *a.* Ad. | Japan. | |
| *b–c.* Hgr. & yg. | Malay Archipelago. | Dr. Bleeker. |

## 75. Epinephelus polyphekadion.

Serranus polyphekadion, *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 39, *and Nat. Tijdschr. Nederl. Ind.* vii. 1854, p. 417; *Günth.* i. p. 128 (1859).
Serranus goldmanni, *Bleek. Nat. Tijdschr. Nederl. Ind.* ix. 1855, p. 434; *Günth. t. c.* p. 126.

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Epinephelus goldmanni, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 99, *and Atl. Ichth.* vii. p. 59, pl. cclxxxix. fig. 2 (1876).
Epinephelus polyphekadion, *Bleek. ll. cc.* pp. 97, 58, pl. cclxxxvii. fig. 3.

D. XI 14–15. A. III 8. Sc. 95–105 $\frac{12-14}{45-50}$; l. l. 60.

Teeth in broad bands, in four series on the sides of the mandible; canines rather small, disappearing in old specimens. Depth of body 3 to $3\frac{1}{4}$ times in length of head, length of head $2\frac{3}{5}$ to $2\frac{4}{5}$ times. Snout a little longer than diameter of eye, which is 5 times in length of head; interorbital width 6 times in length of head; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye, the width of its distal extremity $\frac{2}{3}$ diameter of eye; præopercle rounded, finely serrated on its posterior border, the serræ very slightly enlarged at the angle; middle opercular spine nearer lower than upper, lower further back than upper; opercular flap pointed, its upper border feebly curved; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers moderate, 16 or 17 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the fourth, which is $\frac{2}{3}$ to $\frac{3}{4}$ length of head, a little longer than last spine, and shorter than longest soft rays. Pectoral $\frac{3}{5}$ length of head. Ventral shorter, not reaching anus. Second and third anal spines equal, nearly $\frac{1}{4}$ length of head and $\frac{3}{5}$ to $\frac{1}{2}$ length of longest soft rays. Caudal rounded. Scales smooth above lateral line, ciliated on the sides. Olive-brown, clouded with darker, and dotted all over with orange and black.

Total length 360 millim.

Malay Archipelago.

*a*. Ad. ——?

## 76. Ephinephelus merra.

Epinephelus merra, *Bloch, Ausl. Fische*, vii. p. 17, pl. cccxxix. (1793); *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 88, *and Atl. Ichth.* vii. p. 55, pl. ccci. fig. 2 (1876).
Holocentrus hexagonatus, *Bl. Schn. Syst. Ichth.* p. 323 (1801).
Holocentrus merra, *Lacép. Hist. Poiss.* iv. p. 384 (1802).
Serranus merra, *Cuv. & Val.* ii. p. 325 (1828).
Serranus foveatus, *Cuv. & Val. t. c.* p. 329.
Serranus hexagonatus, *Cuv. & Val. t. c.* p. 330, and vi. p. 516 (1830); *Guér. Icon. R. An., Poiss.* pl. iv. fig. 1 (1830); *Richards. Voy. Sulphur, Zool.* p. 82, pl. xxxviii. fig. 1 (1844); *Cantor, Cat. Mal. Fish.* p. 7 (1850); *Bleek. Nat. Tijdschr. Nederl. Ind.* vi. 1854, p. 191; *Günth.* i. p. 140 (1859); *Kner, Novara, Fische*, p. 25 (1865); *Günth. Fische Südsee*, p. 7, pl. vii. (1873); *Day, Fish. Ind.* p. 14, pl. ii. fig. 3 (1875), *and Faun. Ind., Fish.* i. p. 447 (1889).
Serranus nigriceps, *Cuv. & Val.* vi. p. 517 (1830).
Serranus confertus, *Bennett, Life of Raffles*, p. 686 (1830).
Serranus stellans, *Richards. Ann. & Mag. N. H.* ix. 1842, p. 23; *Bleek. Act. Soc. Sc. Ind. Neerl.* i. no. 5, 1856, p. 29.
Perca hexagonata, *Forst. Descr. Anim.* p. 189 (1844).



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Serranus reevesii, *Richards. Rep. Ichth. China*, p. 232 (1846).
Epinephelus hexagonatus, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 232.
Serranus hexagonatus, part., *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 683.
Epinephelus stellans, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 86, *and Atl. Ichth.* vii. p. 54, pl. cccxxxii. fig. 4 (1876).

D. XI 15–17. A. III 8. Sc. 95–120 $\frac{10-13}{52-44}$; l. l. 55–70.

Teeth in rather broad bands in the adult, in three or four series on the sides of the mandible; canines moderate. Depth of body 3 to $3\frac{1}{2}$ times in total length, length of head $2\frac{3}{5}$ to 3 times. Snout as long as or longer than diameter of eye, which is 4 to $5\frac{1}{2}$ times in length of head; interorbital width 6 to 7 times in length of head; lower jaw strongly projecting; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præopercular border rounded, finely serrated behind, the serræ slightly enlarged at the angle; opercular spines equidistant, lower further back than upper; opercular flap pointed, upper border nearly straight; head covered with cycloid scales; maxillary naked or with a few scales. Gill-rakers moderate, 15 to 17 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the fourth or fifth, which is $\frac{1}{3}$ to $\frac{3}{7}$ length of head, not or but slightly longer than the last, and a little shorter than longest soft rays. Pectoral $\frac{2}{5}$ to $\frac{3}{4}$ length of head. Ventral shorter, not reaching anus. Second anal spine as long as or a little longer than third, $\frac{1}{3}$ to $\frac{3}{7}$ length of head, at least $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales mostly ciliated. Head, body, and soft vertical fins covered with dark brown spots separated by a honeycombed network of light lines; some of the spots by being darker may form crossbars on the body.

Total length 320 millim.

Indian and Western Tropical Pacific Oceans.

A. No white dots on the body; pectoral whitish, with round black spots. (*E. merra*, Bl.)

| | | |
|---|---|---|
| *a*. Yg. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *b*. Yg., skin. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *c*. Hgr. | Mauritius. | Mus. Comp. Zoology [E.]. |
| *d*. Ad. | Rodriguez. | G. Gulliver, Esq. [P.]. |
| *e*. Hgr. | Port Blair, Andamans. | F. Day, Esq. [P.]. |
| *f*. Yg. | China. | Sir J. Richardson [P.]. |
| *g*. Yg. | Loo Choo Islands. | H. Pryer, Esq. [P.]. |
| *h–i*. Ad. & hgr. | East Indies. | Haslar Collection. |
| *k*. Hgr. | Philippines. | |
| *l*. Hgr. | Java. | |
| *m–q*. Hgr. & yg. | Amboyna. | |
| *r–t*. Hgr. | Duke of York Island. | Rev. G. Brown [C.]. |

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| | | |
|---|---|---|
| *u*. Hgr. | Ysabel Id., Solomons. | J. Brenchley, Esq. [P.]. |
| *v*. Hgr. | Aneiteum, New Hebrides. | J. Brenchley, Esq. [P.]. |
| *w*. Hgr., skin. | Aneiteum, New Hebrides. | |
| *x*. Ad. | Samoa. | Rev. S. J. Whitmee [P.]. |
| *y*. Hgr. | Levuka, Fiji. | Dr. Coppinger [C.]. H.M.S. 'Alert.' |
| *z*. Hgr. | Moala, Fiji. | J. Macgillivray, Esq. [P.]. |
| *α–β*. Yg. | Fiji. | H.M.S. 'Herald.' |
| *γ*. Hgr. | Micronesia. | |
| *δ–ε*. Hgr. & yg. | E. Australia. | G. Krefft, Esq. [P.]. |
| *ζ*. Hgr. | —— ? | Dr. P. Russell [P.]. |

B. Head, body, and fins with whitish dots in addition to the dark spots; pectoral without black spots. (*P. hexagonata*, Forst.; *S. stellans*, Richards.)

| | | |
|---|---|---|
| *a*. Yg. | Madagascar. | Dr. J. E. Gray [P.]. |
| *b*. Hgr. | Melville Id., Torres Straits. | Sir J. Richardson [P.]. (Type of *S. stellans*.) |
| *c–d*. Hgr. & yg. | Micronesia. | |

C. No white dots; three large blackish spots on the back at the base of the dorsal, and a fourth on the caudal peduncle; pectoral fins with dusky spots separated by a whitish honeycombed network. (*S. foveatus*, C. & V.; *S. reevesii*, Richards.)

| | | |
|---|---|---|
| *a*. Ad. | Seychelles. | Prof. E. P. Wright [C.]. |
| *b*. Ad. | Moluccas. | |
| *c*. Hgr. | Micronesia. | |

*Serranus melas*, Peters, Mon. Berl. Ac. 1855, p. 429, from Mozambique, is a doubtful species. D. XI 17; A. III 8. Form of *S. merra*. Uniform black.—The description is insufficient, and Prof. Hilgendorf informs me that the type specimen is no longer to be found in the Berlin Museum.

### 77. Epinephelus socialis.

Serranus socialis, *Günth. Fische Südsee*, p. 7, pl. viii. fig. B (1873).

D. XI 15. A. III 8. Sc. 110 $\frac{12-13}{40-45}$; l. l. 70–72.

Teeth in rather broad bands, in three series on the sides of the mandible; canines moderate. Depth of body nearly equal to length of head, 3 to 3¼ times in total length. Snout as long as or a little longer than diameter of eye, which is 5 to 5½ times in length of head; interorbital width 7 to 8 times in length of head; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye, the width of its distal extremity ⅓ to ⅔ diameter of eye; præopercular border rounded, finely serrated behind, the serræ slightly enlarged at the angle; opercular spines equidistant, lower further back than upper; opercular flap pointed, upper border feebly



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curved; head covered with cycloid scales; maxillary scaly. Gill-rakers moderate, 17 or 18 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the third or fourth, which is about $\frac{1}{3}$ length of head and $\frac{2}{3}$ to $\frac{3}{4}$ length of longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral a little shorter, not quite reaching anus. Second and third anal spines equal, $\frac{2}{7}$ to $\frac{1}{3}$ length of head, $\frac{3}{5}$ to $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales mostly ciliated. Pale greyish or brownish, with numerous small round dark spots, which are blackish on the head and anterior part of body, dark brown and more or less confluent into undulous longitudinal lines further back; three or four large dark blotches at base of dorsal; fins dark, with a light margin, dorsal, anal, and caudal with small whitish round spots.

Total length 240 millim.; stated to grow to 900 millim.

Polynesia.

| | | | |
|---|---|---|---|
| *a*. Hgr. | Tahiti. | Museum Godeffroy. | (Types.) |
| *b*. Hgr. | Samoa. | Museum Godeffroy. | |
| *c*. Hgr. | Paumotu. | Museum Godeffroy. | |

### 78. Epinephelus tauvina.

*Russell, Descr. Fish.* ii. pls. cxxvii. & cxxviii. (1803).
Perca tauvina, *Forsk. Descr. Anim.* p. 39 (1775).
Holocentrus malabaricus, *Bl. Schn. Syst.* p. 319, pl. lxiii. (1801).
Holocentrus tauvina, *Bl. Schn. l. c.* p. 321.
Holocentrus salmoides, *Lacép. Poiss.* iii. pl. xxxiv. fig. 3, and iv. p. 389 (1802).
Bola? coioides, *Ham. Buch. Fish. Ganges*, p. 82 (1822).
Serranus maculosus, *Cuv. & Val.* ii. p. 332 (1828).
Serranus bontoo, *Cuv. & Val. t. c.* p. 334; *Cantor, Cat. Mal. Fish.* p. 11 (1850); *Günth.* i. p. 138 (1859); *Day, Fish. Malab.* p. 3 (1865).
Serranus suillus, *Cuv. & Val. t. c.* p. 335; *Günth. t. c.* p. 127; *Playf. & Günth. Fish. Zanz.* p. 5 (1866).
Serranus semipunctatus, *Cuv. & Val. t. c.* p. 341; *Günth.* i. p. 114; *Day, Fish. Ind.* p. 20 (1873), *and Faun. Ind., Fish.* i. p. 452 (1889).
Serranus salmonoides, *Cuv. & Val. t. c.* p. 343; *Günth. t. c.* p. 128; *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 682, *and Fische Roth. Meer.* p. 5 (1884).
Serranus crapao, *Cuv. & Val.* iii. p. 494 (1829); *Richards. Ann. & Mag. N. H.* ix. 1842, p. 25; *Bleek. Verh. Bat. Gen.* xxii. 1849, *Perc.* p. 37; *Günth. t. c.* p. 137.
? Serranus diacopeformis, *Benn. Life of Raffles*, p. 686 (1830).
Serranus schihpan, *Richards. Rep. Ichth. China*, p. 231 (1846).
? Serranus variegatus, *Richards. l. c.*
Serranus coioides, *Cantor, l. c.*
Serranus polypodophilus, *Bleek. l. c.*
Serranus abdominalis, *Peters, Mon. Berl. Ac.* 1855, p. 430.
Serranus diacanthus, part., *Günth. t. c.* p. 110.
Serranus jansenii, *Bleek. Nat. Tijdschr. Nederl. Ind.* xiii. 1857, p. 376.
? Serranus chabaudi, *Casteln. Mém. Poiss. Afr. Austr.* p. 3 (1861).
Serranus tauvina, *Klunz. ll. cc.* pp. 683, 6, pl. i. fig. 3.
Epinephelus pantherinus, *Bleek. Verh. Ak. Amst.* xiv. no. 2, 1873, p. 33, *and Atl. Ichth.* vii. p. 51, pl. cclxxxvi. fig. 1 (1876).
Epinephelus polypodophilus, *Bleek. ll. cc.* pp. 36, 59, pl. cclxxxiii. fig. 1.

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Epinephelus janseni, *Bleek. Il. cc.* pp. 80, 51, pl. cclxxxix. fig. 5.
Serranus malabaricus, *Day, Fish. Ind.* p. 19, pl. iv. fig. 2 (1875).
Serranus salmoides, *Day, l. c.* p. 20, pl. iv. fig. 3, *and Faun. Ind., Fish.* i. p. 452 (1889).
? Homalogrystes güntheri, *Alleyne & Macleay, Proc. Linn. Soc. N. S. W.* i. 1876, p. 269, pl. vi. fig. 3.
? Serranus estuarius, *Macleay, Proc. Linn. Soc. N. S. W.* viii. 1883, p. 200.
Serranus pantherinus, *Day, Faun. Ind., Fish.* i. p. 451.
Epinephelus malabaricus, *Sauv. Hist. Madag., Poiss.* p. 67 (1891).

D. XI 14–16. A. III 8. Sc. 100–120 $\frac{12-15}{34-45}$; l. l. 60–70.

Teeth in narrow bands in the young, in broader bands in the adult, in three series on the sides of the mandible in the latter; canines small, disappearing in old specimens. Depth of body $3\frac{1}{3}$ to $3\frac{2}{3}$ times in total length, length of head $2\frac{2}{3}$ to 3 times. Snout longer than diameter of eye, which is 5 (young) to 8 times in length of head; interorbital width 5 to $7\frac{1}{2}$ times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity at least $\frac{2}{3}$ diameter of eye; præopercular border angular, sometimes somewhat produced at the angle, which is armed with moderately enlarged serræ; opercular spines nearly equidistant, lower further back than upper; upper border of opercular flap nearly straight; head nearly entirely covered with cycloid scales. Gill-rakers moderately elongate, 9 to 11, and 5 to 8 rudiments, on lower part of anterior arch. Dorsal originating above axilla or base of pectoral; spines increasing in length to the third or fourth, which is about $\frac{1}{3}$ length of head and shorter than longest soft rays. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second anal spine as long as or a little shorter than third, about $\frac{1}{2}$ to $\frac{2}{3}$ as long as longest soft rays. Caudal rounded. Scales mostly ctenoid, cycloid in old specimens. Brown, with darker spots or markings, or five or six more or less regular dark cross-bands; frequently with white and black dots, which are wide apart in the young and increase in number with age; old specimens dark brown, closely dotted with black.

Total length 1270 millim.

Indian and Western Pacific Oceans.

| | | |
|---|---|---|
| *a.* Yg. | Red Sea. | Rüppell Coll. |
| *b.* Hgr., stffd. | Red Sea. | |
| *c–d.* Yg. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *e,f.* Hgr. & yg., skins. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *g–h.* Hgr. & yg. | Port Natal. | |
| *i.* Hgr. | Port Natal. | Mr. T. Ayres [C.]. |
| *k, l, m.* Ad. (4–4½ feet) & hgr., stffd. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *n.* Hgr., skin. | Muscat. | A. S. G. Jayakar, Esq [P.]. |
| *o.* Ad. (2¾ feet), skin. | Fao, Persian Gulf. | W. Cumming, Esq. [P.]. |
| *p.* Hgr., skin. | Ceylon. | H. Nevill, Esq. [P.]. |
| *q–t, u–v.* Hgr. & yg. | Madras. | F. Day, Esq. [P.]. |

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| | | |
|---|---|---|
| *w*, *x*, *y*, *z*, *a*. Hgr. & yg., skins. | Madras. | F. Day, Esq. [P.]. |
| *β*. Hgr., stffd. | Madras. | Capt. Mitchell [P.]. |
| *γ*, *δ*, *ε*. Hgr., stffd. | Madras. | Gen. Hardwicke [P.]. |
| *ζ*. Yg. | Vizagapatam. | Capt. Mitchell [P.]. |
| *η*. Yg. | Bengal. | Gen. Hardwicke [P.]. |
| *θ*–*ι*. Ad. & hgr. | Singapore. | Governor of Singapore [P.]. |
| *κ*. Ad. | Malay Archipelago. | Bleeker Coll. (As *E. polypodophilus*.) |
| *λ*–*ν*. Hgr. & yg. | Malay Archipelago. | Bleeker Coll. |
| *ξ*. Yg. | Borneo. | Rajah Brooke [P.]. |
| *o*–*σ*, *τ*, *υ*. Hgr. & yg. | Formosa. | R. Swinhoe, Esq. [C.]. |
| *φ*–*ψ*. Yg. | Amoy, China. | |
| *ω*. Yg. | China. | Intern. Fisheries Exhib. 1883. |
| *aa*. Hgr. | Ponape, Caroline Ids. | Museum Godeffroy. |
| *bb*. Hgr. | N. Celebes. | Dr. A. B. Meyer [C.]. |
| *cc*. Yg. | Amboyna. | F. Day, Esq. [P.]. |
| *dd*. Hgr. | Pelew Ids. | Museum Godeffroy. |
| *ee*, *ff*. Hgr., skins. | Port Essington. | |
| *gg*. Yg., skin. | Port Essington. | J. Gould, Esq. [C.]. |
| *hh*. Hgr. | Port Denison. | |
| *ii*–*kk*. | Port Bowen. | Museum Godeffroy. |
| *ll*. Yg., skel. | Java. | |

### 79. Epinephelus multinotatus.

Serranus multinotatus, *Peters, Mon. Berl. Ac.* 1876, p. 435.

D. XI 16. A. III 8. Sc. 140 $\frac{24}{60}$.

Stated to agree in every respect with *E. tauvina*=*malabaricus*, except in the smaller scales. Brown, covered all over with small round black spots.

Total length 275 millim.

Mauritius.

### 80. Epinephelus micronotatus.

Serranus micronotatus, *Rüpp. N. Wirbelth. Abyss., Fische*, p. 90 (1835); *Günth.* i. p. 137 (1859); *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 685, *and Fische R. Meer*. p. 6 (1884).

D. XI 15. A. III 9.

Stated by Klunzinger to be very closely allied to *E. tauvina*. Grey-brown, with numerous small dark brown spots; lower surface of head and body unspotted; a greyish-white streak from below the eye to the pectoral fin.

Red Sea.

### 81. Epinephelus cæruleopunctatus.

Holocentrus cæruleopunctatus, *Bloch, Ausl. Fische*, iv. p. 94, pl. ccxlii. fig. 2 (1790).

Serranus leucostigma (*Ehrenb.*), *Cuv. & Val.* ii. p. 346 (1828).

Serranus summana, part., *Rüpp. Atlas, Fische R. Meer*. p. 104

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(1828); *Klunz. Verh. zool.-bot. Ges. Wien.* xx. 1870, p. 685, *and Fische R. Meer.* p. 5, pl. ii. fig. 2 (1884).

Serranus dermochirus, *Cuv. & Val.* vi. p. 513* (1830); *Day, Fish. Ind.* p. 21 (1875).

Serranus hoevenii, *Bleek. Ver. Batav. Gen.* xxii. 1849, *Perc.* p. 36; *Günth.* i. p. 138 (1859); *Playf. & Günth. Fish. Zanz.* p. 9, pl. ii. fig. 3 (1866); *Day, Faun. Ind., Fish.* i. p. 449 (1889).

Serranus kunhardtii, *Bleek. Nat. Tijdschr. Nederl. Ind.* ii. 1851, p. 169.

Serranus cæruleopunctatus, *Peters, Mon. Berl. Ac.* 1865, p. 108.

Epinephelus hoevenii, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 232, *Verh. Akad. Amst.* xiv. no. 2, 1873, p. 110, *and Atl. Ichth.* vii. p. 63, pls. cclxxxii. fig. 1, cclxxxvi. fig. 3, & ccxc. fig. 4 (1876).

Serranus tumilabris (*non C. & V.*), *Day, Fish. Ind.* p. 16, pl. iii. fig. 3 (1875).

D. XI 15–16. A. III 8. Sc. 105–110 $\frac{12-15}{38-45}$; l. l. 55–65.

Teeth in rather broad bands, in three or four series on the sides of the mandible; canines small, disappearing in old specimens. Depth of body 3 to $3\frac{1}{3}$ times in total length, length of head $2\frac{2}{3}$ to 3 times. Snout as long as or a little longer than diameter of eye, which is $4\frac{1}{2}$ to $5\frac{1}{2}$ times in length of head; interorbital width 7 to 8 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præopercular border rounded, very finely serrated, the serræ slightly enlarged at the angle; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap pointed, its upper border feebly curved; head covered with cycloid scales; maxillary naked or with a few scales. Gill-rakers short, 15 to 18 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the third or fourth, which is not or but little longer than the last, and shorter than soft rays. Pectoral $\frac{2}{5}$ to $\frac{3}{4}$ length of head. Ventral shorter, not reaching anus in the adult. Second and third anal spines equal, $\frac{1}{3}$ to $\frac{1}{4}$ length of head, $\frac{1}{2}$ to $\frac{2}{3}$ length of longest soft rays. Caudal rounded. Scales mostly ciliated. Dark purplish brown, with more or less distinct round whitish spots; maxillary groove edged with black; young with the spots large and few, black-edged, forming ocelli; fins with or without light dots.

Total length 560 millim.

Indian Ocean, from the Red Sea, the coast of Zanzibar, and the Mascarene Islands, to the Malay Archipelago and the Caroline Islands.

| | | |
|---|---|---|
| *a, b.* Hgr. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *c.* Hgr., stffd. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *d, e, f.* Hgr. & yg., skins. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *g.* Ad. | Seychelles. | Prof. E. P. Wright [C.]. |
| *h.* Ad. | Mauritius. | P. L. Sclater, Esq. [P.]. |
| *i.* Ad., skin. | Ceylon. | H. Nevill, Esq. [P.]. |
| *k.* Hgr. | Ceylon. | H. Nevill, Esq. [P.]. |

* Type (Paris Mus. no. 7650) examined.

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| | | |
|---|---|---|
| *l–m.* Hgr. & yg. | Malay Archipelago. | Bleeker Coll. |
| *n–q.* Yg. | Borneo. | A. Everett, Esq. [P.]. |
| *r.* Yg. | Philippines. | |
| *s, t.* Hgr. & yg. | Amboyna. | |
| *u.* Yg. | Misol. | |
| *v, w.* Ad. | Ponape, Caroline Ids. | Museum Godeffroy. |

### 82. Epinephelus summana.

Perca summana, *Forsk. Descr. Anim.* p. 42 (1775).
Holocentrus ongus, *Bloch, Ausl. Fische*, iv. p. 69, pl. ccxxxiv. (1790).
Bodianus summana, *Bl. Schn. Syst.* p. 334 (1801).
Pomacentrus summana, *Lacép. Poiss.* iv. p. 511 (1802).
Serranus reticularis, *Cuv. & Val.* ii. p. 323 (1828); *Günth.* i. p. 150 (1859).
Serranus summana, *Cuv. & Val.* ii. p. 344; *Lefebvre, Voy. Abyss., Zool.* p. 329, pl. v. fig. 1 (1845); *Günth. t. c.* p. 137; *Playf. & Günth. Fish. Zanz.* p. 8, pl. ii. fig. 1 (1866); *Day, Fish. Ind.* p. 21, pl. iv. fig. 4 (1875), *and Faun. Ind., Fish.* i. p. 453 (1889).
Serranus tumilabris, *Cuv. & Val. t. c.* p. 346; *Günth. t. c.* p. 138; *Playf. & Günth. l. c.* fig. 2.
Serranus alboguttatus, *Cuv. & Val. t. c.* p. 366; *Günth. t. c.* p. 129.
Serranus summana, part., *Rüpp. Atlas, Fische R. Meer.* p. 104 (1828); *Kunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 685, *and Fische R. Meer.* p. 5, pl. ii. fig. 1 (1884).
Serranus bataviensis, *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 38; *Günth. t. c.* p. 129.
Serranus ongus, *Peters, Mon. Berl. Ac.* 1865, p. 102.
Epinephelus bataviensis, *Bleek. Nederl. Tijdschr. Dierk.* ii. 1865, p. 277.
Epinephelus polystigma, *Bleek. l. c.*
Epinephelus summana, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 105, *and Atl. Ichth.* vii. p. 61, pl. cclxxxv. fig. 4 (1876); *Sauv. Hist. Madag., Poiss.* p. 63 (1891).
Epinephelus ongus, *Bleek. ll. cc.* pp. 113, 64, pl. cclxxxii. fig. 2.
Epinephelus cæruleopunctatus, *Bleek. Atl.* p. 62, pl. cclxxxiv. fig. 1.

D. XI 15. A. III 8. Sc. 105–120 $\frac{11-13}{42-46}$; l. l. 55–62.

Teeth in rather broad bands, in three series on the sides of the mandible; canines small. Depth of body 3 to $3\frac{1}{4}$ times in total length, length of head $2\frac{2}{3}$ to $2\frac{3}{4}$ times. Snout as long as or a little longer than diameter of eye, which is 4 to 5 times in length of head; interorbital width $6\frac{1}{2}$ to 9 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye; præopercular border rounded, very finely serrated, the serræ scarcely enlarged at the angle; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap obtuse, its upper border very convex; head nearly entirely covered with cycloid scales; maxillary naked or with a few scales. Gill-rakers short, 16 to 18 on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, $\frac{1}{3}$ to $\frac{2}{5}$

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length of head, as long as or a little shorter than longest soft rays; last spines distinctly shorter; pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral much shorter, not reaching anus. Second anal spine as long as or a little longer than third, $\frac{2}{7}$ to $\frac{2}{6}$ length of head, $\frac{2}{3}$ to $\frac{3}{4}$ length of longest soft rays. Caudal rounded. Scales mostly ciliated. Brown above, with more or less numerous small yellowish or greyish-white round spots; the interspaces between them may form reticulate or undulous oblique lines; large pale round blotches may be present in addition to the small spots; some specimens with a series of darker blotches at the base of the dorsal; vertical fins covered with yellowish round spots and edged with yellowish; maxillary groove edged with black.

Total length 330 millim.

Indian Ocean, from the Red Sea and the coast of Zanzibar to the Malay Archipelago, and the Caroline Islands.

| | | |
|---|---|---|
| *a–b.* Hgr. & yg. | Red Sea. | Rüppell Coll. |
| *c.* Ad., skin. | Red Sea. | Rüppell Coll. |
| *d.* Hgr. | Massowah. | Marquis G. Doria [P.]. |
| *e.* Hgr., stffd. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *f.* Ad., skin. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *g.* Yg. | Malay Archipelago. | Bleeker Coll. |
| *h.* Ad. | Malay Archipelago. | F. Day, Esq. [P.]. |
| *i.* Yg. | Borneo. | A. Everett, Esq. [C.]. |
| *k.* Ad. | Java. | |
| *l.* Ad. | Manado, Celebes. | Dr. A. B. Meyer [C.]. |
| *m.* Ad. | N. Celebes. | Dr. A. B. Meyer [C.]. |
| *n–o, p.* Yg. | Amboyna. | |
| *q–r.* Ad. | Ponape, Caroline Ids. | Museum Godeffroy. |

### 83. Epinephelus fuscoguttatus.

Perca summana, var. fuscoguttata, *Forsk. Descr. Anim.* p. 42 (1775).

Serranus horridus, *Cuv. & Val.* ii. p. 321 (1828); *Bleek. Verh. Bat. Gen.* xxii. 1849, *Perc.* p. 36.

Serranus fuscoguttatus, *Rüpp. Atlas, Fische R. Meer.* p. 108, pl. xxvii. fig. 2 (1828); *Günth.* i. p. 127 (1859); *Playf. & Günth. Fish. Zanz.* p. 5 (1866); *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 684; *Day, Fish. Ind.* p. 22, pl. v. fig. 3 (1875); *Klunz. Fische Roth. Meer.* p. 4 (1884); *Day, Faun. Ind., Fish.* i. p. 454 (1889).

Serranus tæniocheirus, *Cuv. & Val.* vi. p. 518 (1830).

Serranus lutra, *Cuv. & Val.* viii. p. 474 (1831); *Günth. t. c.* p. 126.

Serranus lebretonianus, *Hombr. & Jacq. Voy. Pôle Sud, Zool.* iii. *Poiss.* p. 33, pl. i. fig. 3 (1846).

Serranus hexagonatus, var. merra, part., *Günth. t. c.* p. 141.

Serranus microdon, *Bleek. Nat. Tijdschr. Nederl. Ind.* xi. 1856, p. 86.

? Serranus goliath, *Peters, Mon. Berl. Ac.* 1855, p. 430.

Epinephelus horridus, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 232.

Sebastes meleagris, *Peters, Mon. Berl. Ac.* 1865, p. 392.

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Serranus dispar, *Playf. & Günth. l. c.* p. 6, pl. i. figs. 2 & 3; *Günth. Fische Südsee*, p. 9 (1873).
Epinephelus fuscoguttatus, *Bleek. Verh. Ak. Amst.* xiv. no. 2, 1873, p. 93, *and Atl. Ichth.* vii. p. 57, pl. cccvii. fig. 3 (1876).
Epinephelus microdon, *Bleek. ll. cc.* pp. 95. 57, pl. cclxxxi. fig. 3.
Epinephelus lutra, *Sauv. Hist. Madag., Poiss.* p. 70, pl. vii. fig. 3 (1891).

D. XI 13–15. A. III 8. Sc. 110–145 $\frac{15-20}{45-60}$; l. l. 55–70.

Teeth in narrow bands in the young, in broad bands in the adult; canines small, disappearing in old specimens. Depth of body nearly equal to length of head, $2\frac{4}{5}$ to $3\frac{1}{4}$ times in total length. Eye 5 (young) to 7 times in length of head; interorbital width 4 to 7 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity at least $\frac{2}{3}$ diameter of eye; præopercular border rounded, finely serrated, the serræ somewhat enlarged at the angle; middle opercular spine usually nearer lower than upper, lower not further back than upper; upper border of opercular flap very convex, directed downwards; head nearly entirely covered with cycloid scales. Gill-rakers short, 16 to 18 on lower part of anterior arch. Dorsal originating above axilla or base of pectoral; spines increasing in length to the third or fourth, which is as long as or a little shorter than longest soft rays. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head. Ventral shorter, not reaching anus. Second anal spine as long as or a little shorter than third, about $\frac{1}{2}$ length of longest soft rays. Caudal rounded. Scales cycloid or very feebly ciliated in the adult, mostly ctenoid in the young. Young greyish or pale brownish above, with large dark brown spots or irregular marblings, with or without more or less numerous small round dark brown or black spots; four or five large dark brown or blackish blotches at the base of the dorsal, and a blackish spot on the dorsal surface of the caudal peduncle. Adult with the markings very indistinct; or dark brown, speckled all over with black.

Total length 900 millim.

Indian and Western tropical Pacific Oceans.

| | | |
|---|---|---|
| *a*. Ad. (3 ft.), stffd. | Mauritius. | M. V. de Robillard [C.]. |
| *b*, *c*. Hgr. & yg., skins. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *d*–*e*. Hgr. & yg. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *f*, *g*. Hgr. & yg. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *h*. Hgr., stffd. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *i*. Hgr., stffd. | Seychelles. | Sir Lambert Playfair [P.]. (Types of *S. dispar*.) |
| *k*–*l*. Yg. | Borneo. | Dr. C. Collingwood [P.]. |
| *m*. Yg. | Philippines. | |

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| | | |
|---|---|---|
| *n.* Hgr., skin. | Hope Id., N.E. Australia. | F. M. Rayner, Esq. [P.]. |
| *o.* Hgr. | Tongatabu. | H.M.S. 'Challenger.' |
| *p.* Ad., stffd. | Samoa. | Rev. S. J. Whitmee [P.]. |
| *q.* Hgr. | Samoa. | Rev. S. J. Whitmee [P.]. |
| *r.* Yg. | Greenwich Id. | Museum Godeffroy. |
| *s.* Hgr. | Meduro, Marshall Ids. | Museum Godeffroy. |

## 84. Epinephelus lanceolatus.

Holocentrus lanceolatus, *Bloch, Ausl. Fische*, iv. p. 92, pl. cclxii. fig. 1 (1790); *Russell, Fish. Corom.* ii. p. 23, pl. cxxx. (1803).
Serranus lanceolatus, *Cuv. & Val.* ii. p. 316 (1828); *Cantor, Cat. Mal. Fish.* p. 8 (1850); *Günth.* i. p. 107 (1859); *Day, Fish. Malab.* p. 4, pl. i. (1865); *Playf. & Günth. Fish. Zanzib.* p. 4 (1866); *Day, Proc. Zool. Soc.* 1869, p. 512, *Fish Ind.* pp. 18 & 101, pl. iv. fig. 1 (1875), *and Faun. Ind., Fish.* i. p. 450 (1889).
Serranus geographicus, *Cuv. & Val. t. c.* p. 322; *Günth. t. c.* p. 150.
Serranus horridus (*non C. & V.*), *Cantor, l. c.* p. 9; *Günth. t. c.* p. 136.
Batrachus gigas, *Günth. Ann. & Mag. N. H.* (4) iii. 1869, p. 131; *Ward, t. c.* p. 352.
Epinephelus lanceolatus, *Bleek. Verh. Ak. Amst.* xiv. no. 2, 1873, p. 53, *and Atl. Ichth.* vii. p. 49, pl. cccxxxii. fig. 3 (1876).

D. XI 14–15. A. III 8. Sc. 100–110 $\frac{14-15}{42-50}$; l. l. 58–67.

Teeth in narrow bands in the young, in broad bands in the adult; canines small, disappearing in old specimens. Depth of body equal to length of head, $2\frac{3}{4}$ to $3\frac{1}{4}$ times in total length. Eye small, 5 (young) to 12 times in length of head; interorbital width 4 to $5\frac{1}{2}$ times in length of head; snout very short; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye, the width of its distal extremity equal to or exceeding diameter of eye: præopercular border rounded, finely serrated, the serræ somewhat enlarged at the angle; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap obtusely pointed, its upper border strongly curved; head entirely covered with cycloid scales. Gill-rakers moderate, 14 on lower part of anterior arch. Dorsal originating above base of pectoral; spines short, slightly increasing in length to the last, the third $\frac{1}{5}$ to $\frac{1}{3}$ length of head, and $\frac{2}{5}$ to $\frac{3}{5}$ length of longest soft rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second anal spine a little shorter than third, $\frac{2}{5}$ to $\frac{1}{2}$ length of longest soft rays. Caudal rounded. Scales smooth or feebly ciliated; tubes of lateral line mostly with several diverging tubules. Young yellowish or orange, with four dark brown cross-bands, the first across the occiput and nape, the second across the spinous portion of the dorsal, the third from the soft dorsal across the anal, the fourth round the caudal peduncle; the first and second bands uniting behind the opercle; fins with a few blackish-brown spots. In

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half-grown specimens the bands disappear, the body is reticulated with dark brown, the meshes of the network enclosing lighter spots, and the spots on the fins are more numerous. Old specimens uniform brown.

Total length 218 centim. (7 feet 2 in.); grows to 12 feet.

Indian Ocean; West Coast of Africa (?).

| | | |
|---|---|---|
| *a*. Yg. | Port Natal. | Mr. T. Ayres [C.]. |
| *b*. Ad., stffd. (6 ft. 8 in.). | Mauritius. | |
| *c*. Yg., skin. | Zanzibar. | Sir Lambert Playfair [P.]. |
| *d*. Head of large spec., dry. | Seychelles. | Swinburn Ward, Esq. [P.]. (Type of *Batrachus gigas*.) |
| *e*. Ad., stffd. (7 ft. 2 in.) | Madras. | Secretary of State for India [P.]. |
| *f*. Hgr., stffd. | Madras. | Secretary of State for India [P.]. |
| *g*. Yg., stffd. | Madras. | Madras Museum. |
| *h*. Yg., stffd. | Madras. | Capt. Mitchell [P.]. |
| *i–k*. Yg. | Pinang. | Dr. Cantor. |
| *l*, *m*, *n*. Yg., skins. | Pinang. | Dr. Cantor. |
| *o*. Yg. | Pinang. | |
| *p*. Yg., skin. | Singapore. | |
| *q*. Ad., stffd. (5 ft. 10 in.). | W. Africa (?). | |

## 85. Epinephelus itaiara.

*Marcgrav, Hist. Nat. Bras.* p. 169 (1648).

Perca guttata, part., *Linn. S. N.* i. p. 485 (1766).

Serranus itaiara, *Lichtenst. Abh. Ak. Berl.* 1820–21, p. 279; *Cuv. & Val.* ii. p. 376 (1828); *Peters, Mon. Berl. Ac.* 1865, p. 110; *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 90, pl. ii. fig. 4 (1877).

Serranus galeus, *Müll. & Trosch. in Schomburgk, Reise Brit. Guian.* iii. p. 621 (1848); *Günth.* i. p. 130 (1859).

Serranus gigas, part., *Günth. t. c.* p. 133.

Serranus guasa, *Poey, Mem. Cuba*, ii. pp. 141 & 354 (1860).

Promicrops guasa, *Poey, Repert. Cuba*, ii. 1868, p. 287; *Jord. & Gilb. Syn. Fish. N. Am.* p. 542 (1882); *Goode, Fish. & Fisher. Ind. U.S.* i. pl. clxv. (1884).

Serranus quinquefasciatus, *Bocourt, Ann. Sc. Nat.* (5) x. 1868, p. 223.

Oligorus terræ-reginæ, *Ramsay, Proc. Linn. Soc. N. S. W.* v. 1880, p. 90, pl. ix.

? Oligorus goliath, *De Vis, Proc. Linn. Soc. N. S. W.* vii. 1882, p. 318.

Epinephelus quinquefasciatus, *Jord. & Gilb. Bull. U.S. Fish. Comm.* ii. 1882, p. 106.

Epinephelus guasa, *Goode & Bean, Proc. U.S. Nat. Mus.* v. 1882, p. 238.

Epinephelus galeus, *Jord. Proc. Ac. Philad.* 1883, p. 285.

Epinephelus itaiara, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 124.

Promicrops itaiara, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 377.

Promicrops guttatus, *Jord. & Eigenm. Bull. U.S. Fish. Comm.* viii. 1890, p. 363.

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D. XI 15–16. A. III 8. Sc. 115–135 $\frac{14-16}{35-45}$; l. l. 60–68.

Teeth small, in narrow bands in the young, in broad bands in the adult; canines small, disappearing in old specimens. Depth of body nearly equal to length of head, $\frac{1}{3}$ total length. Eye small, 6 (young) to 12 times in length of head; interorbital width $3\frac{1}{2}$ to $4\frac{1}{2}$ times in length of head; snout very short; upper profile of head slightly concave; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye, the width of its distal extremity at least equal to the diameter of the eye in the adult, a little less in the young; præopercular border rounded, finely serrated, the serræ somewhat enlarged at the angle; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap obtusely pointed, its upper border strongly curved; head nearly entirely covered with scales, some of which are rough and ciliated. Gill-rakers short, 10 or 11 (and a few rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral or axilla; spines short, increasing in length to the third or fourth, which measures $\frac{2}{3}$ (young) to $\frac{1}{2}$ (adult) length of longest soft rays. Pectoral $\frac{2}{5}$ to $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second anal spine shorter than third, not more than $\frac{1}{2}$ length of longest soft rays. Caudal rounded. Scales nearly all rough and ciliated; tubes of the lateral line mostly with several diverging tubules. Brownish or pale olive-green in the young, with five rather irregular dark brown cross-bars on the body, and with round blackish spots on the head, body, and fins; the cross-bars are less distinct and the black spots more numerous in the adult, and old specimens may be uniform blackish brown.

Grows to 2 metres (6 feet).

Atlantic coasts of America, from Florida to Brazil; Pacific coasts of America, from the Gulf of California to Panama; East coast of Australia.

| | | |
|---|---|---|
| *a*. Ad. (2 ft. 8 in.). | Jamaica. | Institute of Jamaica [P.]. |
| *b*. Hgr. | Jamaica. | Int. Fisheries Exhib. 1883. |
| *c*. Ad., stffd. (5 ft. 3 in.). | Sabanilla, Colombia. | Capt. W. H. Milner [P.]. |
| *d*. Yg. | Brit. Guiana. | Sir R. Schomburgk [P.]. |
| *e*. Yg. | Dutch Guiana ? | Lidth de Jeude Collection. |
| *f*. Ad., stffd. (5 ft. 7 in.). | Clarence R., N.S. Wales. | Australian Museum [E.]. |
| *g*. Hgr. | —— ? | |
| *h*. Hgr., skel. | Jamaica. | |

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V. ALPHESTES, Bl. Schn. (*Prospinus*, Poey).—Dorsal with 11 spines; anal with 9 soft rays. Canines very small, none in lower jaw. Lower præopercular border notched in front of angle, which is armed with an antrorse spine. Frontal bones with an anterior excavation for the reception of the posterior processes of the præmaxillaries, and with a process or knob on each side behind the interorbital area; supraoccipital and parietal crests produced on the frontals, but not extending to between the orbits.

Fig. 18.—Upper view of cranium of *Epinephelus afer*.

### 86. Epinephelus afer.

Epinephelus afer, *Bloch, Ausl. Fische*, vii. p. 12, pl. cccxxvii. (1793).
Alphestes afer, *Bl. Schn. Syst. Ichth.* p. 311 (1801); *Peters, Mon. Berl. Ac.* 1865, p. 105; *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 396; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 350.
Plectropoma chloropterum, *Cuv. & Val.* ii. p. 398 (1828); *Poey, Mem. Cuba*, i. p. 73, pl. ix. fig. 3 (1851); *Günth.* i. p. 164 (1859); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 107, pl. v. fig. 3 (1877).
Plectropoma monacanthus, *Müll. & Trosch. in Schomb. Hist. Barbad.* p. 665 (1847); *Günth. l. c.*
Prospinus chloropterus, *Poey, Repert. Cuba*, ii. 1868, p. 289.
Alphestes monacanthus, *Cope, Trans. Amer. Philos. Soc.* (2) xiv. 1871, p. 467.
? Serranus armatus, *Osorio, Jorn. Sc. Lisb.* (2) iii. 1894, p. 74.

D. XI 17–19. A. III 9. Sc. 75–80 $\frac{9-10}{33-37}$; l. l. 50–60.

Teeth small, in narrow bands, in two series on the sides of the mandible; canines very small, none in lower jaw. Depth of body

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2⅔ to 3 times in total length, length of head 3 times. Snout shorter than diameter of eye, which is 3½ to 4 times in length of head; interorbital width 7 to 8 times in length of head; lower jaw feebly projecting; maxillary extending to below posterior third or posterior border of eye, the width of its distal extremity ½ diameter of eye; præopercular border obtusely angulate, finely serrated behind, with slightly enlarged serræ at the angle and a strong antrorse spine below the latter, separated from the lower border by a notch; middle opercular spine nearer lower than upper, lower not further back than upper; opercular flap with the upper border strongly curved; head covered with cycloid scales; maxillary naked. Gill-rakers short, 14 to 16 on lower part of anterior arch. Dorsal originating above base of pectoral; fourth spine longest, ⅔ to ¾ length of head, considerably longer than last spine, ⅔ to ¾ length of longest soft rays. Pectoral ¾ length of head. Ventral shorter, reaching anus or not quite so far. Second anal spine as long as or slightly longer than third, ⅓ length of head, ⅔ to ⅔ length of longest soft rays. Caudal rounded. Scales cycloid above lateral line, ciliated on the sides. Brown or olive, spotted or marbled with darker; pectorals dull olive or olive-red, with bluish spots.

Total length 210 millim.

Atlantic coasts of America, from the West Indies to the Falkland Islands; coast of Guinea?

| | | |
|---|---|---|
| *a*. Ad. | St. Croix. | |
| *b*. Hgr. | Dominica. | |
| *c*. Ad. | Grenada. | |
| *d*. Ad., stffd. | W. Indies. | |
| *e*. Ad., skin. | W. Indies. | |
| *f*. Ad., stffd. | Falkland Ids. | W. E. Wright, Esq. [P.]. |
| *g*. Skeleton. | St. Croix. | |

### 87. Epinephelus multiguttatus.

Plectropoma multiguttatum, *Günth. Proc. Zool. Soc.* 1866, p. 600.
Plectropoma afrum, *Günth. Trans. Zool. Soc.* vi. 1868, p. 411, pl. lxvii. fig. 3.
Alphestes multiguttatus, *Jord. & Gilb. Proc. U.S. Nat. Mus.* v. 1882, p. 375; *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 395; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 349.
Epinephelus multiguttatus, *Jord. & Gilb. Proc. U.S. Nat. Mus.* v. 1882, p. 625.

D. XI 18–20. A. III 9. Sc. 75–80 $\frac{9-10}{34-35}$; l. l. 55–62.

Teeth small, in narrow bands, in two series on the sides of the mandible; canines very small. Depth of body nearly equal to length of head, 3 times in total length. Snout as long as or a little shorter than diameter of eye, which is 4 to 5 times in length of head; interorbital width 6½ to 8 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity ½ to ⅔ diameter of eye; præopercular border obtusely angular, finely serrated

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behind, with slightly enlarged serræ at the angle, and a strong antrorse spine below the latter, separated from the lower border by a notch; middle opercular spine nearer lower than upper, lower not further back than upper. Gill-rakers moderate, the longest as long as gill-fringes, 15 or 16 on lower part of anterior arch. Dorsal originating above base of pectoral; fourth spine longest, $\frac{2}{5}$ to $\frac{3}{7}$ length of head, considerably longer than last spine, nearly as long as longest soft rays. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral shorter, reaching anus or not quite so far. Second anal spine longer than third, $\frac{2}{5}$ length of head, as long as or a little shorter than longest soft rays. Caudal rounded. Scales cycloid above lateral line, ciliated on the sides. Brown, with numerous dark round spots; soft dorsal and posterior part of body more or less distinctly streaked with darker; pectoral with 5 to 8 dark cross-bars.

Total length 240 millim.

Pacific coast of Mexico and Central America.

| | | |
|---|---|---|
| *a–d.* Ad. & lgr. | Pacific coast of C. America. | Capt. J. C. Dow [P.]. (Types.) |
| *e.* Ad. | Las Peñas, Jalisco. | Dr. A. C. Buller [C.]. |

VI. DERMATOLEPIS, Gill (*Lioperca*, Gill).—Dorsal with 11 spines; anal with 9 or 10 soft rays. Teeth very small, canines indistinct or absent. Lower opercular spine absent. Frontal bones with anterior concavity for the reception of the posterior processes of the præmaxillaries, and with a process or knob on each side behind the interorbital area; supraoccipital and parietal crests produced on the frontals to between the orbits.

### 88. Epinephelus dermatolepis.

Dermatolepis punctatus, *Gill, Proc. Ac. Philad.* 1861, p. 54; *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 407.

D. XI 19–20. A. III 9. Sc. 115 $^{20}$.

Teeth small; no canines. Depth of body $2\frac{2}{5}$ times in total length, length of head nearly 3 times; diameter of eye 6 times in length of head, interorbital width $7\frac{1}{2}$ times; jaws subequal; maxillary extending to below centre of eye; præopercle not serrated, its posterior border with a few irregular crenations; opercle with a rudimentary spine; maxillary, præorbital, and tip of snout naked. Gill-rakers shortish, about 13 on lower part of anterior arch. Dorsal spines low, strong, subequal, the longest $\frac{1}{4}$ length of head and shorter than longest soft rays. Pectoral hardly $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second anal spine shorter than third, $\frac{1}{5}$ length of head, $\frac{1}{2}$ length of longest soft rays. Caudal subtruncate, with rounded angles. Scales all cycloid. Dusky brown, mottled with darker, and with irregular, rounded, whitish blotches; head and breast thickly covered with small round dark spots; top of head

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with some dark longitudinal streaks; pectoral with small black spots: other fins blackish, with small pale spots.

Total length 600 millim.

Coasts of Lower California and Revillagigedo Islands.

### 89. Epinephelus inermis.

Serranus inermis, *Cuv. & Val.* ix. p. 436 (1833); *Poey, Mem. Cuba*, i. p. 54, pl. iv. fig. 2 (1851); *Günth.* i. p. 153 (1859).
Lioperca inermis, *Poey, Repert. Cuba*, ii. 1868, p. 282.
Dermatolepis inermis, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 405.

D. XI 19. A. III 9. Sc. 115–125 $\frac{18-20}{45-50}$; l. l. 70.

Teeth small, in narrow bands, in two series on the sides of the mandible; canines very small or absent. Depth of body $2\frac{1}{3}$ to $2\frac{1}{2}$ times in total length, length of head 3 to $3\frac{1}{3}$ times; snout a little longer than diameter of eye, which is $4\frac{1}{2}$ to 5 times in length of head; interorbital width 6 to 7 times in length of head; jaws equal; maxillary extending to below centre or posterior border of eye, the width of its distal extremity $\frac{2}{5}$ diameter of eye; præopercle rounded, posterior border finely serrated, the serræ slightly enlarged at the angle; opercle with a single small spine; opercular flap pointed, its upper border very convex; head covered with cycloid scales; maxillary naked. Gill-rakers nearly as long as gill-fringes, 14 or 15 on lower part of anterior arch. Dorsal originating a little in advance of base of pectoral; third or fourth spine longest, $\frac{1}{2}$ length of head, shorter than longest soft rays; posterior spines much shorter; soft portion angulated. Pectoral as long as head. Ventral shorter, reaching anus or a little beyond. Second anal spine shorter than third, nearly $\frac{1}{4}$ length of head, $\frac{2}{5}$ length of longest soft rays; soft portion pointed, middle rays longest. Caudal rounded. Scales all cycloid. Brown, with irregular larger and smaller round white spots; fins darker, also with whitish spots.

Total length 230 millim.; grows to 500 millim.

West Indies.

| | | |
|---|---|---|
| *a*. Hgr. | Cuba. | Zoological Society. |
| *b*. Hgr. | W. Indies. | Zoological Society. |

### 90. Epinephelus striolatus.

Serranus striolatus, *Playf. & Günth. Fish. Zanz.* p. 11, pl. iii. fig. 2 (1866).
Serranus gibbosus, *Bouleng. Proc. Zool. Soc.* 1887, p. 654.
Cromileptes altivelis, part., *Day, Proc. Zool. Soc.* 1888, p. 258, *and Faun. Ind., Fish.* i. p. 441 (1889).

D. XI 18–20. A. III 9–10. Sc. 110–115 $\frac{22-23}{60-65}$; l. l. 70–75.

Teeth small, in two series on the sides of the mandible; canines absent. Depth of body $2\frac{1}{2}$ to 3 times in total length, length of head 3 to $3\frac{1}{2}$ times; upper profile of head slightly concave, nape more or less elevated; snout longer than diameter of eye, which is $6\frac{1}{2}$ times in length of head; interorbital width 7 times in length of head;



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jaws equal; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity nearly equal to diameter of eye; præopercle rounded, posterior border very feebly denticulate; a single opercular spine, the upper spine quite obtuse, the lower absent; upper border of opercular flap strongly sinuous; head covered with cycloid scales; maxillary naked. Gill-rakers rather long, the longest as long as gill-fringes, 14 on lower part of anterior arch. Dorsal originating a little in advance of base of pectoral; third and fourth spines longest, $\frac{2}{5}$ to $\frac{1}{2}$ length of head, shorter than longest soft rays; posterior spines much shorter. Pectoral $\frac{3}{4}$ to $\frac{4}{5}$ length of head. Ventral shorter, reaching anus. Second anal spine shorter than third, nearly $\frac{1}{6}$ length of head and $\frac{1}{3}$ length of longest soft rays. Caudal rounded. Scales all cycloid. Brown or olive, with round blackish spots, some of which are surrounded by a light ring; on the sides with broken dark brown longitudinal lines.

Total length 470 millim.

Coast of Zanzibar, Mouth of Persian Gulf.

| | | | |
|---|---|---|---|
| *a*. | Ad., stffd. | Zanzibar. | Sir Lambert Playfair [C.]. (Type.) |
| *b*. | Yg. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *c*. | Ad. | Muscat. | A. S. G. Jayakar, Esq. [P.]. (Type of *S. gibbosus*.) |
| *d*. | Ad. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |

VII. MYCTEROPERCA, Gill (*Trisotropis*, Gill).—Dorsal with 11 spines; anal with 10 to 12 soft rays. Frontal bones without anterior concavity or notch for the reception of the posterior processes of the præmaxillaries, without processes on the upper surface; supraoccipital crest not produced forwards; parietal crests produced on the frontals to between the orbits.

Fig. 19.—Upper view of cranium of *Epinephelus bonaci*.

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### 91. Epinephelus venenosus.

*Catesby, Nat. Hist. Carol.* ii. pl. v. (1743).
Perca venenosa, *Linn. S. N.* i. p. 486 (1766).
Johnius guttatus, *Bl. Schn. Syst. Ichth.* p. 77 (1801).
Serranus cardinalis, *Cuv. & Val.* ii. p. 378 (1828).
Serranus rupestris, *Cuv. & Val.* ix. p. 437 (1833); *Günth.* i. p. 145 (1859).
Serranus petrosus, *Poey, Mem. Cuba,* ii. p. 136 (1860).
Trisotropis cardinalis, *Poey, Ann. Lyc. N.Y.* ix. 1870, p. 303.
Trisotropis petrosus, *Poey, l. c.* p. 304; *Jord. & Gilb. Syn. Fish. N. Am.* p. 918 (1882).
Trisotropis undulosus, part., *Goode, Bull. U.S. Nat. Mus.* no. 5, 1876, p. 55.
Epinephelus venenosus, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 124.
Mycteroperca venenosa, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 373; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 369.
Mycteroperca venenosa, var. guttata, *Jord. & Swain, l. c.*
Mycteroperca venenosa, var. apua (*non Bl.*), *Jord. & Eigenm. l. c.*

D. XI 16. A. III 10–11. Sc. $120–125\frac{20}{}$.

Teeth in narrow bands, in two series on the sides of the mandible; canines strong. Depth of body 3 times in total length, length of head $2\frac{3}{4}$ to $2\frac{2}{3}$ times; snout rather blunt, arched in profile, shorter than diameter of eye, which is $5\frac{1}{2}$ (young) to 7 times in length of head; interorbital region flat or slightly concave, its width 5 to 6 times in length of head; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye; præopercle without salient angle, its emargination slight, the serræ below the notch slightly enlarged. Gill-rakers very few and short, 8 (besides some rudiments) on lower part of anterior arch. Third and fourth dorsal spines longest, about $\frac{1}{3}$ length of head. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Ventral shorter. Second anal spine shorter than third; soft portion rounded. Caudal crescentically emarginate. Scales mostly cycloid. Olive, grey, or scarlet, with red and black markings; the blacker blotches along middle of sides much larger and quadrate in the young; pectorals blackish, in the adult broadly tipped with orange-yellow.

Total length 720 millim.

West Indies, Florida Keys, Bermuda.

### 92. Epinephelus tigris.

Serranus tigris, *Cuv. & Val.* ix. p. 440 (1833); *Günth.* i. p. 112 (1859).
Serranus undulosus, part., *Günth. t. c.* p. 143.
Serranus camelopardalis, *Poey, Mem. Cuba,* p. 132 (1860).
Serranus felinus, *Poey, l. c.* p. 134.
Serranus rivulatus, *Poey, l. c.* p. 135.
Trisotropis reticulatus, *Gill, Proc. Ac. Philad.* 1865, p. 105.
Trisotropis camelopardalis, *Poey, Repert. Cuba,* ii. 1868, p. 283, *and Ann. Lyc. N. Y.* ix. 1870, p. 307.
Trisotropis felinus, *Poey, Repert. Cuba,* ii. 1868, p. 283.



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Trisotropis tigris, *Poey, Ann. Lyc. N. Y.* ix. 1870, p. 307.
Mycteroperca tigris, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 364; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 369.
Mycteroperca reticulata, *Jord. & Swain, l. c.* p. 373.

D. XI 16–17. A. III 10–11. Sc. 125–135 $\frac{18-20}{50-55}$; l. l. 80–83.

Teeth strong, in narrow bands, in two series on the sides of the mandible; canines large. Depth of body 3 to 3½ times in total length, length of head 2¾ to 3 times. Snout longer than diameter of eye, which is 6 to 7 times in length of head; interorbital space convex, its width 5 to 6 times in length of head; nostrils close together, the posterior much the larger in the adult; lower jaw very prominent; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity ¾ diameter of eye; præopercular border rounded, finely serrated, the serræ slightly enlarged at the angle; middle opercular spine much nearer lower than upper, former not extending beyond latter; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers few (6 to 9) and very short on lower part of anterior arch, merely one or two near the angle being elongate. Third and fourth or fourth and fifth dorsal spines longest, ½ length of head, as long as longest soft rays. Pectoral ⅔ length of head. Ventral shorter, not reaching anus. Second anal spine shorter than third, ¼ length of head, ½ length of longest soft rays. Caudal truncate or feebly emarginate. Scales mostly cycloid. Brown or red, with bluish-grey reticulations on the flanks and 7 or 8 more or less distinct bluish-grey cross-bars, descending obliquely forwards on the back; cheeks with a polygonal network of bluish lines; fins purplish or bluish black, with a narrow yellowish edge; pectoral blackish at the base, yellowish or pale greenish at the end.

Total length 720 millim.

Coasts of Bermuda and West Indies.

| | | |
|---|---|---|
| *a*. Ad. | Bermuda. | J. M. Jones, Esq. [P.]. |
| *b*. Ad. | Cuba. | Zoological Society. |
| *c*. Ad. | Jamaica. | Institute of Jamaica [P.]. |
| *d, e*. Ad. & hgr., stffd. | West Indies. | |

### 93. Epinephelus microlepis.

Serranus acutirostris, part., *Cuv. & Val.* ix. p. 432 (1833).
Serranus ongus, part., *Günth.* i. p. 142 (1859).
Trisotropis microlepis, *Goode & Bean, Proc. U.S. Nat. Mus.* ii. 1879, p. 141; *Jord. & Gilb. Syn. Fish. N. Am.* p. 538 (1882); *Goode, Fish. & Fisher. Industr. U.S.* i. pl. clxvii. (1884).
Trisotropis stomias, *Jord. & Gilb. Proc. U.S. Nat. Mus.* v. 1882, p. 273, *and l. c.*
Epinephelus microlepis, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 124.
Mycteroperca microlepis, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 367; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 371.

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D. XI 16–19. A. III 10–11. Sc. 140–145 $\frac{20-24}{50-60}$; l. l. 88–95.

Teeth in narrow bands, in two series on the sides of the mandible; canines strong. Depth of body $3\frac{1}{3}$ to $3\frac{2}{3}$ times in total length, length of head $2\frac{5}{8}$ to $2\frac{4}{5}$ times; snout rather pointed, longer than diameter of eye, which is 6 to $6\frac{1}{2}$ times in length of head; interorbital space convex, its width 6 to 7 times in length of head; lower jaw projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity $\frac{2}{3}$ diameter of eye; præopercle without distinct emargination above the angle, which is rounded and armed with feebly enlarged radiating serræ; middle opercular spine nearer lower than upper; former not further back than latter; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers long, few, about 12 on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth spines longest, about $\frac{1}{3}$ length of head, about as long as longest soft rays. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head. Ventral shorter, not reaching anus. Second anal spine shorter than third, $\frac{1}{3}$ to $\frac{1}{5}$ length of head, $\frac{1}{2}$ or not quite $\frac{1}{2}$ length of longest soft rays; soft portion rounded. Caudal crescentically emarginate in the adult, truncate in the young. Scales mostly cycloid. Olive or brownish grey, uniform or clouded with darker, or with faint traces of darker spots; dorsal, anal, and caudal fins with a fine whitish edge; pectorals olive, dusky towards the tip.

Total length 440 millim.

Gulf Coast of the United States, north to North Carolina; coast of Brazil (?).

| | | |
|---|---|---|
| *a*. Ad. | Pensacola, Florida. | Smithsonian Instit. |
| *b*. Yg. | Bahia (?). | |

### 94. Epinephelus falcatus.

Serranus undulosus, part., *Günth.* i. p. 143 (1859).
Serranus falcatus, *Poey, Mem. Cuba*, ii. p. 138 (1860).
Trisotropis falcatus, *Poey, Repert. Cuba*, ii. 1868, p. 285; *Goode & Bean, Proc. U.S. Nat. Mus.* ii. 1879, p. 140; *Jord. & Gilb. Syn. Fish. N. Am.* p. 538 (1882).
Trisotropis undulosus, part., *Goode, Bull. U.S. Nat. Mus.* no. 5, 1876, p. 55.
Trisotropis brunneus, *Goode & Bean, Proc. U.S. Nat. Mus.* ii. 1879, p. 143.
Epinephelus falcatus, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 124.
Mycteroperca falcata, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 362; *Jord & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 368.
Mycteroperca falcata, var. phenax, *Jord. & Swain, l. c.*

D. XI 16–18. A. III 10–11. Sc. 130–140 $\frac{20-22}{47-55}$; l. l. 72–85.

Teeth in narrow bands, in two series on the sides of the mandible; canines rather large. Depth of body nearly equal to length of head, 3 to $3\frac{1}{3}$ times in total length. Snout pointed, longer than diameter of eye, which is 5 to 6 times in length of

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head; interorbital space convex, its width 5 to 6 times in length of head; nostrils close together, the posterior the larger in the adult; lower jaw very prominent; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{3}{5}$ to $\frac{3}{4}$ diameter of eye; præopercular border rounded or slightly produced at the angle, with a slight notch above the latter, finely serrated, the serræ slightly enlarged at the angle; middle opercular spine much nearer lower than upper, former extending scarcely beyond latter; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers elongate, slender, 15 or 16 (besides some rudiments) on lower part of anterior arch. Third and fourth dorsal spines longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, as long as or a little shorter than longest soft rays. Pectoral $\frac{2}{3}$ length of head. Ventral a little shorter, not reaching anus. Second anal spine shorter than third, $\frac{1}{5}$ to $\frac{1}{4}$ length of head, $\frac{2}{5}$ length of longest soft rays; soft portion pointed, notched behind, middle rays longest. Caudal crescentically emarginate. Scales mostly cycloid in the adult, ciliated in the young. Brownish, with numerous small darker spots; soft dorsal, anal, pectoral, and caudal fins with a blackish and whitish edge.

Total length 500 millim.

Southern coast of Florida, Bermuda, West Indies.

| | | |
|---|---|---|
| *a*. Ad. | Bermuda. | J. M. Jones, Esq. [C.]. |
| *b*. Hgr. | Key West, Florida. | Prof. D. S. Jordan [E.]. (One of the types of var. *phenax*.) |
| *c*. Hgr., skin. | Jamaica. | Parnell Collection. |
| *d*. Hgr. | Grenada. | |

### 95. Epinephelus rosaceus.

Epinephelus rosaceus, *Streets, Bull. U.S. Nat. Mus.* no. 7, 1877, p. 51.

Trisotropis rosaceus, *Jord. & Gilb. Bull. U.S. Fish Comm.* ii. 1882, p. 107.

Mycteroperca rosacea, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 361.

D. XI 17–18. A. III 11. Sc. 130.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body nearly 3 times in total length, length of head $2\frac{4}{5}$ times. Snout rather long and pointed; diameter of eye 7 times in length of head, interorbital width about 4 times; nostrils very close together, the posterior much the larger; lower jaw projecting; maxillary reaching to below posterior border of eye; præopercle with the angle a little salient, the emargination above it rather indistinct, the serræ small, those near the angle somewhat enlarged. Gill-rakers long, about 17 on lower part of anterior arch. Dorsal spines rather slender, third longest, $3\frac{1}{6}$ times in length of head. Pectoral half length of head, longer than ventral. Anal spines small, second shorter than third; soft portion very deep and falcate, middle rays produced in a point.

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Caudal feebly emarginate. Scales mostly cycloid. Uniform brick-red in life, tips of pectorals dusky.

Total length 960 millim.

Gulf of California.

### 96. Epinephelus jordani.

Epinephelus jordani, *Jord. & Everm. Proc. U.S. Nat. Mus.* xi. 1888, p. 140.

Mycteroperca jordani, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 371.

D. XI 17. A. III 11. Sc. 130–140 $\frac{20}{}$.

Teeth in narrow bands, in two series on the sides of the lower jaw; canines rather strong. Depth of body $3\frac{1}{2}$ times in total length, length of head $2\frac{1}{2}$ times; diameter of eye 7 times in length of head, interorbital width 6 times; lower jaw projecting; maxillary extending to below posterior border of eye or slightly beyond; præopercle slightly emarginate above the angle, which is armed with slightly enlarged serræ. Gill-rakers rather short, about 10 (besides several rudiments) on lower part of anterior arch. Third dorsal spine longest, about $\frac{1}{3}$ length of head, shorter than longest soft ray. Pectoral slightly more than $\frac{1}{2}$ length of head. Ventral shorter. Second anal spine shorter than third, $\frac{1}{3}$ length of head; soft portion rounded. Caudal very slightly emarginate. Brown, with irregular darker mottlings; head with numerous dark streaks radiating from the eye; fins dusky, pectorals paler.

Total length 360 millim.

Gulf of California.

### 97. Epinephelus olfax.

Serranus olfax, *Jenyns, Zool. Beagle, Fish.* p. 9, pl. iv. (1842); *Günth.* i. p. 153 (1859), *and Proc. Zool. Soc.* 1877, p. 67.

Mycteroperca olfax, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 376; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 367.

Mycteroperca olfax ruberrima, *Jord. & Eigenm. l. c.*

D. XI 17–18. A. III 10–11. Sc. 110–120 $\frac{20}{50}$; l. l. 75.

Teeth in narrow bands, in two series on the sides of the mandible; canines strong. Depth of body $3\frac{1}{3}$ to 4 times in total length, length of head 3 times; snout rather pointed, longer than diameter of eye, which is 6 to 7 times in length of head; interorbital region flattish, its width $4\frac{1}{2}$ to $4\frac{2}{3}$ times in length of head; nostrils close together, the posterior very large; lower jaw very prominent; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity $\frac{2}{3}$ diameter of eye; præopercular border rounded, slightly notched above the angle, finely serrated, the serræ slightly enlarged at the angle; middle opercular spine nearer lower than upper, former not extending beyond latter; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers long, 15 (besides a few

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rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral; second or second and third spines longest, nearly twice as long as penultimate, $\frac{2}{5}$ to $\frac{1}{2}$ length of head, considerably longer than longest soft rays. Pectoral $\frac{3}{5}$ length of head. Ventral shorter, not reaching anus. Second anal spine shorter than third, $\frac{1}{5}$ to $\frac{1}{4}$ length of head. Caudal slightly emarginate. Scales mostly cycloid. Brown; young with small round brown spots; some specimens bright red, or with the head and fins red.

Total length 440 millim.

East Pacific, from the Galapagos Islands to Panama.

*a*. Ad., not good state. Charles Id., Galapagos. Commander Cookson [P.].

### 98. Epinephelus calliurus.

Mycteroperca calliura, *Poey, Repert. Cuba*, i. 1865, pp. 181, 409; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 368.
Trisotropis calliurus, *Poey, op. cit.* ii. 1868, p. 284.

D. XI 16-17. A. III 11. Sc. circa 100.

Teeth in narrow bands, in two series on the sides of the mandible. Depth of body equal to length of head, 3 times in total length; snout a little longer than diameter of eye, which is 5 times in length of head; nostrils close together, the posterior very large: maxillary extending to below centre of eye; præopercular border rounded, the serræ slightly enlarged at the angle. Gill-rakers few, 12 on lower part of anterior arch. Second anal spine shorter than third; soft portion rounded. Caudal crescentically emarginate. Brownish, everywhere with greyish reticulations around small brown spots; fins all edged with dusky; lips greenish.

Total length 500 millim.

Coast of Cuba.

### 99. Epinephelus dimidiatus.

Serranus dimidiatus, *Poey, Mem. Cuba*, ii. p. 129 (1860).
Trisotropis dimidiatus, *Poey, Repert. Cuba*, ii. 1868, p. 285.
Mycteroperca dimidiata, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 367; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 372.

D. XI 16–17. A. III 11. Sc. circa 100.

Teeth in narrow bands, in two series on the sides of the mandible. Depth of body equal to length of head, 3 times in total length; snout a little longer than diameter of eye, which is 5 times in length of head; lower jaw projecting; maxillary extending to below centre of eye; angle of præopercle salient, armed with enlarged serræ. Gill-rakers rather slender, 14 on lower part of anterior arch. Second anal spine shorter than third; soft portion rounded. Caudal crescentically emarginate. Dark purplish brown above, pinkish beneath, the two colours with sharp demarcation-line, which passes

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through the eye; a black spot on each side of the caudal peduncle; soft dorsal, anal, and caudal edged with black.

Total length 200 millim.

Coast of Cuba.

### 100. Epinephelus bonaci.

*Parra, Descr. Piez. Hist. Nat.* pl. xvi. fig. 2 (1787).
Serranus undulosus, part., *Günth.* i. p. 143 (1859).
Serranus bonaci, *Poey, Mem. Cuba*, ii. p. 129 (1860).
Serranus brunneus, *Poey, l. c.* p. 131.
Serranus arara, *Poey, l. c.* p. 132.
Serranus decimalis, *Poey, l. c.* p. 138.
Serranus cyclopomatus, *Poey, l. c.* p. 353.
Serranus latepictus, *Poey, l. c.*
Trisotropis aguaji, *Poey, Repert. Cuba*, ii. 1866, p. 229, and 1868, p. 284, *and Ann. Lyc. N. H. N. Y.* ix. 1870, p. 305.
Trisotropis bonaci, *Poey, ll. cc.* 1868, pp. 283, 306.
Trisotropis brunneus, *Poey, ll. cc.* pp. 284, 305.
Trisotropis undulosus, part., *Goode, Bull. U.S. Nat. Mus.* no. 5, 1876, p. 55.
Epinephelus bonaci, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 124.
Mycteroperca bonaci, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 370; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 370.
Mycteroperca bonaci, var. xanthosticta, *Jord. & Swain, l. c.* p. 371.

D. XI 16–18. A. III 11–12. Sc. 120–125 $\frac{18}{50-52}$; l.l. 70–85.

Teeth strong, in narrow bands, in two series on the sides of the mandible; canines strong. Depth of body 3 to $3\frac{1}{3}$ times in total length; length of head 3 times. Snout longer than diameter of eye, which is $5\frac{1}{2}$ (young) to 8 times in length of head and equals or is less than interorbital width; lower jaw very prominent; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity at least $\frac{2}{3}$ diameter of eye; præopercular border rounded, slightly notched above the angle, which is armed with slightly enlarged serræ; middle opercular spine much nearer lower than upper; former not or but slightly further back than latter; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers long, 10 to 12 (besides rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth spines longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, as long as or a little shorter than longest soft rays. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus. Second anal spine shorter than third, $\frac{1}{3}$ to $\frac{1}{4}$ length of head, $\frac{2}{5}$ to $\frac{1}{2}$ length of longest soft rays. Caudal truncate or slightly emarginate. Scales mostly smooth in the adult, ciliated in the young. Brown, uniform or with more or less distinct darker, red or blackish, rounded blotches on the sides, separated by a pale network; soft dorsal, anal, and caudal fins blackish at the end, with a fine whitish edge; pectorals dark at the base, pale at the end.

Total length 850 millim.

Caribbean Sea to Bermuda.

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| | | |
|---|---|---|
| *a*. Ad. | Bermuda. | J. M. Jones, Esq. [P.]. |
| *b–c*. Yg. | Cuba. | Zoological Society. |
| *d*, *e*. Ad. & hgr. | Jamaica. | Institute of Jamaica [P.]. |
| *f*. Ad. | Jamaica. | Intern. Fisheries Exhib., 1883. |
| *g*. Hgr., skin. | Jamaica. | Parnell Collection. |
| *h–i*. Yg. | Dominica. | |
| *k*. Yg. | Grenada. | |
| *l*. Yg. | Trinidad. | Sir J. Richardson [P.]. |
| *m*. Skeleton. | Cuba. | Zoological Society. |
| *n*. Ad., skull. | Jamaica. | Institute of Jamaica [P.]. |

### 101. Epinephelus interstitialis.

Serranus interstitialis, *Poey*, *Mem. Cuba*, ii. p. 127 (1860).
Trisotropis interstitialis, *Poey*, *Repert. Cuba*, ii. 1868, p. 285, *and Ann. Lyc. N. Y.* ix. 1870, p. 303.
? Trisotropis chlorostomus, *Poey*, *ll. cc.* pp. 231, 308.
Mycteroperca interstitialis, *Jord. & Swain*, *Proc. U.S. Nat. Mus.* vii. 1884, p. 365; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 371.

D. XI 16–17. A. III 11–12. Sc. 120 $\frac{20}{}$.

Teeth in narrow bands, in two series on the sides of the mandible; canines moderate. Depth of body $3\frac{1}{2}$ times in total length, length of head $2\frac{2}{3}$ times; snout with rather strongly curved profile, longer than diameter of eye, which is $5\frac{1}{2}$ to $6\frac{1}{2}$ times in length of head; interorbital space slightly concave, its width $5\frac{1}{2}$ times in length of head; lower jaw strongly projecting; maxillary extending to below posterior border of eye or slightly beyond; præopercle with a moderate emargination, its angle a little salient, with slightly coarser serræ. Gill-rakers few, about 17 on lower part of anterior arch. Third and fourth dorsal spines longest, about $\frac{1}{3}$ length of head. Pectoral $\frac{1}{2}$ length of head. Ventral shorter, not reaching anus. Second anal spine shorter than third; soft portion rounded. Caudal truncate or slightly emarginate. Scales feebly ciliated. Brown; the body covered with small square (or rounded) spots, separated by a network of lighter lines; pectorals with a black border ending in white; lips greenish.

Total length 380 millim.

Coast of Cuba.

### 102. Epinephelus xenarchus.

Mycteroperca xenarcha, *Jord. Proc. Ac. Philad.* 1887, p. 387.

D. XI 16. A. III 11. Sc. 110–115.

Teeth in narrow bands, in two series on the sides of the mandible; upper canines strong. Depth of body 3 times in length of head, length of head $2\frac{2}{3}$ times; snout sharp, rather short, longer than diameter of eye, which is $6\frac{1}{2}$ times in length of head and nearly equals interorbital width; lower jaw prominent; maxillary reaching beyond eye; angle of præopercle scarcely salient, but provided with coarser teeth, with a rather sharp notch above. Gill-rakers moderate,

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18 on lower part of anterior arch. Fourth dorsal spine longest, $\frac{1}{3}$ length of head; soft dorsal angular. Pectoral $\frac{2}{3}$ length of head. Soft portion of anal angular, its posterior outline concave. Caudal subtruncate, the outer rays slightly produced. Scales scarcely ciliated. Colour in spirit plain dark olivaceous, the edges of the fins scarcely darker.

Total length 180 millim.

Pacific coast of South America (Galapagos Islands and Peru).

### 103. Epinephelus ruber.

Epinephelus ruber, *Bloch, Ausl. Fische*, vii. p. 22, pl. cccxxxi. (1793).

Serranus acutirostris, *Cuv. & Val.* ii. p. 286 (1828); *Val. in Webb & Berthel. Iles Canar., Ichth.* p. 11, pl. iii. fig. 1 (1843); *Guichen. Explor. Sc. Alg., Poiss.* p. 35 (1850); *Günth.* i. p. 135 (1859); *Steind. Sitzb. Ak. Wien*, lxxxvi. i. 1882, p. 63.

Serranus undulosus, *Cuv. & Val. t. c.* p. 295; *Kner, Novara, Fische*, p. 24 (1865); *Steind. l. c.*

Serranus nebulosus (*non C. & V.*), *Cocco, Giorn. Lett. Sicil.* xlii. 1833, p. 21.

Serranus tinca, *Cantraine, Giorn. Sc. Pisa*, 1833, *and Nouv. Mém. Ac. Brux.* xi. 1838, no. 8, pl. —.

Serranus fuscus, *Lowe, Tr. Cambr. Philos. Soc.* vi. 1836, p. 196; *Val. l. c.* p. 9; *Günth. t. c.* p. 134; *Steind. Sitzb. Ak. Wien*, lvi. i. 1867, p. 616, pl. ii. fig. 1.

Serranus emarginatus, *Val. l. c.* p. 10; *Günth. t. c.* p. 134.

Cerna macrogenis, *Sassi, Catal. Sist. Pesci Lig.* p. 135 (1846); *Canestr. Mem. Ac. Torin.* (2) xxi. 1864, p. 359, pl. i. fig. 1.

Serranus undulosus, part., *Günth. t. c.* p. 143.

Serranus flavocæruleus, part., *Günth. t. c.* p. 144.

Serranus ruber, *Peters, Mon. Berl. Ac.* 1865, p. 107.

Serranus gigas, part., *Steind. Sitzb. Ak. Wien*, lvi. i. 1867, p. 613.

Epinephelus chalinius, *Cope, Tr. Am. Philos. Soc.* (2) xiv. 1871, p. 465.

Serranus macrogenis, *Canestr. Faun. Ital., Pesci*, p. 76 (1874).

Epinephelus cuvieri, *Bleek. Atl. Ichth.* vii. p. 46 (1876).

Cerna acutirostris, *Doderl. Giorn. Sc. Palermo*, xv. 1882, p. 226, pl. iii. fig. 5.

Cerna acutirostris, var. fusca, *Doderl. l. c.* p. 240, pl. iv. fig. 8.

Cerna acutirostris, var. lata, *Doderl. l. c.* p. 243, pl. iii. fig. 5.

Mycteroperca scirenga, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 369.

Epinephelus acutirostris, *Doderl. Man. Ittiol. Medit.* iv. p. 76 (1889).

Mycteroperca rubra, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 372.

Serranus simonyi, *Steind. Sitzb. Ak. Wien*, c. i. 1891, p. 352, pl. i. fig. 1.

D. XI 15–17. A. III 11–12. Sc. 95–115 $\frac{14-16}{40-46}$; l. l. 75–85.

Teeth in narrow bands, in two series on the sides of the mandible; canines small. Depth of body 3 to $3\frac{1}{2}$ times in total length; length of head $2\frac{2}{3}$ to $3\frac{1}{4}$ times; snout pointed, longer than diameter of eye, which is $4\frac{1}{2}$ (young) to 7 times in length of head; interorbital region flat or convex, its width 4 to $5\frac{1}{2}$ times in length of head;

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lower jaw projecting; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{1}{2}$ (young) to $\frac{3}{4}$ diameter of eye; præopercular border rounded, the serræ slightly enlarged at the angle, above which is a slight emargination; middle opercular spine nearer lower than upper, former not further back than latter; opercular flap pointed; head nearly entirely covered with cycloid scales, including the maxillary. Gill-rakers long and slender, closely set, 22 to 35 on lower part of anterior arch. Dorsal originating above base of pectoral; third and fourth spines longest, $\frac{1}{4}$ to $\frac{2}{5}$ length of head, $\frac{2}{3}$ to $\frac{4}{5}$ length of longest soft rays. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Ventral shorter, not reaching anus in the adult. Second anal spine shorter than third, $\frac{1}{6}$ to $\frac{1}{4}$ length of head, $\frac{2}{5}$ to $\frac{3}{5}$ length of longest soft rays; soft portion rounded or angulated. Caudal truncate or feebly emarginate. Scales mostly ciliated in the young, cycloid in the adult Brown or reddish above, uniform or with darker or lighter spots or marblings; a dark streak above the maxillary, sometimes accompanied by a second above it; a dark spot may be present on the back of the caudal peduncle in the young; fins usually dark at the end, sometimes yellowish (or red ?).

Total length 620 millim.

Mediterranean; Atlantic coasts of Africa and South America.

| | | |
|---|---|---|
| *a*. Yg. | Palermo. | Milan Museum [E.]. |
| *b*. Yg. | Algiers. | Sir Lambert Playfair [P.]. |
| *c–d*. Ad. | Madeira. | J. Y. Johnson, Esq. [P.]. |
| *e–f*. Yg. | Puerto Cabello. | |
| *g*. Hgr. | Rio Janeiro. | Mus. of Compar. Zoology [E.]. |
| *h*. Yg. | Brazil. | Lord Stuart [P.]. |
| *i, k*. Hgr. | —— ? | Haslar Collection. |

### 104. Epinephelus pardalis.

Mycteroperca pardalis, *Gilb. Proc. U. S. Nat. Mus.* xiv. 1891, p. 551.

D. XI 17. A. III 11. Sc. circa 90.

Teeth in narrow bands, in two series on the sides of the mandible; canines small. Depth of body 3 times in total length, length of head $2\frac{4}{5}$ times. Snout twice as long as eye, which is 6 times in length of head; interorbital region convex, its width $4\frac{1}{4}$ times in length of head; nostrils close together, posterior larger; lower jaw strongly projecting; maxillary reaching beyond vertical of centre of eye; head covered with scales, including the maxillary. Gill-rakers long, 23 or 24 on lower part of anterior arch. Fourth dorsal spine longest, $\frac{1}{3}$ length of head, shorter than longest soft rays. Second anal spine $\frac{1}{2}$ as long as third. Caudal crescentically emarginate. Head and body profusely covered with round brown spots, largest on caudal peduncle; caudal with a narrow white margin.

Total length 500 millim.

La Paz Bay, Lower California.

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### 105. Epinephelus dermopterus.

Serranus dermopterus, *Temm. & Schleg. Faun. Japon., Pisc.* p. 10 (1844); *Günth.* i. p. 154 (1859); *Steind. Denkschr. Ak. Wien*, lix. 1892, p. 359, pl. ii. fig. 1.

D. XI 19–21. A. III 10. Sc. 130–150 $\frac{21-25}{55-65}$; l.l. 80.

Teeth small, in two series on the sides of the mandible; canines rather small. Body strongly compressed, its depth $2\frac{1}{2}$ to $2\frac{2}{3}$ times in total length, length of head $3\frac{1}{2}$ to $3\frac{2}{3}$ times; nape much elevated, upper profile of head strongly curved; snout as long as or longer than diameter of eye, which is 4 to $5\frac{1}{2}$ times in length of head; interorbital width 5 to 7 times in length of head; lower jaw scarcely projecting; maxillary extending to below centre or posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; præopercular border forming a right angle, the posterior border finely serrated, the serræ a little enlarged at the angle; lower opercular spine not extending quite as far as upper; opercular flap obtuse; head covered with ciliated scales, including the maxillary. Gill-rakers long, 16 or 17 on lower part of anterior arch. Dorsal originating above opercular spines; spines rather feeble, subequal in length from the fourth, which is about $\frac{2}{5}$ length of head, and a little shorter than soft rays. Pectoral $\frac{3}{4}$ length of head, as long as or a little shorter than ventral. Second anal spine a little shorter than third, about $\frac{1}{4}$ length of head and $\frac{1}{3}$ length of longest soft rays. Caudal truncate or subtruncate. Scales all rough and ciliated, including those of the lateral line. Uniform brown, fins blackish.

Total length 200 millim.; grows to 420.

Coasts of China and Japan.

*a–b*. Hgr. China. Intern. Fisheries Exhib., 1883.

## 24. ANHYPERODON.

Serranus, part., *Cuv. & Val.* ii. p. 210 (1828).

Anyperodon, *Günth. Cat.* i. p. 96 (1859); *Bleek. Verh. Ak. Amst.* xiv. no. 2, 1874, p. 21, *Atl. Ichth.* vii. p. 27 (1876), *and Arch. Néerl.* xi. 1876, p. 256.

Body compressed, elongate; scales very small, ciliated. Lateral line complete, the tube straight or directed upwards. Mouth large, protractile; maxillary exposed, with supplemental bone; teeth in jaws in broad villiform bands, the inner movable, depressible, hinged at the base; small canine teeth in front of the upper jaw; teeth on vomer; palatines toothless; tongue smooth. Head entirely scaly; præopercle finely serrated; opercle with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers long. A single dorsal fin, with XI 14–15 rays; the spinous portion much longer than the soft. Anal short, with III 8–9 rays. Caudal rounded. Pectorals symmetrical, rounded, with 16 or 17 rays. Ventrals below the pectorals, close together,

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with a strong spine. Posterior processes of præmaxillaries extending to between the frontals, which are hollowed out anteriorly; knob-like processes on posterior part of frontals; supraoccipital bone extending to between posterior margins of orbits, parietals to between postfrontal processes; parietal and supraoccipital crests very feeble, not extending to the anterior extremity of the bones. Vertebræ 24 (10+14).

Indian and West Pacific Oceans.

### 1. Anhyperodon leucogrammicus.

Serranus leucogrammicus, *Cuv. & Val.* ii. p. 259; *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 33.

Anyperodon leucogrammicus, *Günth.* i. p. 96 (1859); *Playf. Proc. Zool. Soc.* 1867, p. 846; *Bleek. Verh. Ak. Amst.* xiv. no. 2, 1874, p. 22, *and Atl. Ichth.* vii. p. 28, pl. cclxxix. fig. 4 (1876); *Sauv. Hist. Madag., Poiss.* p. 83 (1891).

Epinephelus leucogrammicus, *Bleek. Nederl. Tijdschr. Dierk.* i. 1863, p. 232.

D. XI 14–15. A. III 9. Sc. 120–135 $\frac{12-15}{55-65}$; l. l. 75–85.

Depth of body $3\frac{2}{5}$ to $3\frac{2}{3}$ times in total length, length of head $2\frac{2}{3}$ to $2\frac{4}{5}$ times. Snout $1\frac{1}{2}$ to $1\frac{2}{3}$ as long as diameter of eye, which is 6 to $6\frac{1}{2}$ times in length of head; interorbital width 8 to $9\frac{1}{2}$ times in length of head; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye, the width of its distal extremity equal to or a little less than diameter of eye; præopercle rounded, finely serrated behind; opercular spines moderate, extending nearly equally far behind. Gill-rakers at least as long as gill-fringes, 10 or 11 (and some rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the third or fourth, which measures $\frac{1}{4}$ to $\frac{1}{3}$ length of head and $\frac{2}{3}$ to $\frac{3}{4}$ length of longest soft rays; last spine as long as or a little shorter than second. Pectoral $\frac{1}{2}$ of head, as long as or a little longer than ventral. Second and third anal spines subequal, nearly as long as last dorsal. Caudal rounded. Brown or reddish, with darker spots or reticulations; three or four bluish stripes along the head and body; these stripes become indistinct or disappear in full-grown specimens.

Total length 520 millim.

Indian and Western Tropical Pacific Oceans.

| | | |
|---|---|---|
| *a*. Ad. | Seychelles. | Sir Lambert Playfair [P.]. |
| *b*. Hgr., skin. | Seychelles. | Sir Lambert Playfair [P.]. |
| *c*. Hgr. | N. Celebes. | Dr. A. B. Meyer [C.]. |
| *d*. Hgr. | Amboyna. | |
| *e*. Ad. | Ponape, Caroline Ids. | Museum Godeffroy. |
| *f, g*. Ad. & hgr., skins. | Aneiteum, New Hebrides. | J. McGillivray, Esq. [C.]. |
| *h*. Hgr., skel. | Zanzibar. | Sir Lambert Playfair [P.]. |

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### 2. Anhyperodon urophthalmus.

Serranus urophthalmus, *Bleek. Nat. Tijdschr. Nederl. Ind.* viii. 1855, p. 310; *Günth.* i. p. 155 (1859).

Anyperodon urophthalmus, *Bleek. Verh. Ak. Amst.* xiv. no. 2, 1874, p. 23, *and Atl. Ichth.* vii. p. 29, pl. ccxc. fig. 3 (1876).

D. XI 15. A. III 8. Sc. 105–110 $\frac{11-12}{53-54}$.

This supposed species is founded perhaps merely on the young of *A. leucogrammicus*. The single specimen known differs in having the caudal peduncle a little deeper than long, the second anal spine distinctly longer than the third, and only 8 anal rays. Body striped red and blue; fins uniform yellow; a black-and-blue ocellus at the base of the caudal.

Total length 95 millim.

Batu Island, Malay Archipelago.

## 25. CROMILEPTES.

Serranus, part., *Cuv. & Val.* ii. p. 210 (1828); *Günth. Cat.* i. p. 97 (1859).

Cromileptes, part., *Swains. Nat. Hist.* ii. p. 201 (1839); *Bleek. Verh. Ak. Amst.* xiv. no. 2, 1874, p. 25, *Atl. Ichth.* vii. p. 29 (1876), *and Arch. Néerl.* xi. 1876, p. 257.

Serranichthys, *Bleek. Act. Soc. Sc. Ind. Neerl.* vi. no. 3, 1859, p. 15.

Body strongly compressed; scales very small, cycloid. Lateral line complete, extending on the caudal fin; tubes straight or directed upwards. Mouth large, protractile; maxillary exposed, with supplemental bone; teeth in jaws in broad villiform bands, the inner depressible, hinged at the base; teeth on vomer, a few on palatines; tongue smooth. Posterior nostril a large crescentic vertical slit. Head entirely scaly; præopercle serrated; opercle with two spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers very short, almost rudimentary. A single dorsal fin, with X 18 rays, the spinous portion nearly as long as the soft. Anal short, with III 10 rays. Caudal rounded. Pectorals symmetrical, rounded, with 17 or 18 rays. Ventrals below the pectorals, close together, with a strong spine. Posterior processes of præmaxillaries long, the frontal notched anteriorly for their reception; supraoccipital and parietal bones not extending forwards to between postfrontal processes, with the crests moderately strong and somewhat produced on the frontal bones. Vertebræ 24 (10+14).

Indian and Western Tropical Pacific Oceans.

### 1. Cromileptes altivelis.

Serranus altivelis, *Cuv. & Val.* ii. p. 324, pl. xxxv. (1828); *Richards. Rep. Ichth. China*, p. 230 (1846); *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 33; *Cantor, Cat. Mal. Fish.* p. 10 (1850); *Günth.* i. p. 152 (1859).

Cromileptes altivelis, *Swains. Nat. Hist.* ii. p. 201 (1839); *Bleek.*

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*Verh. Ak. Amst.* xiv. no. 2, 1874, p. 26; *Day, Fish. Ind.* p. 9, pl. i. fig. 2 (1875); *Bleek. Atl. Ichth.* vii. p. 30, pl. cccxxii. fig. 3 (1876).
Serranichthys altivelis, *Bleek. Act. Soc. Sc. Ind. Neerl.* vi. no. 3, 1859, p. 15; *Kner, Denkschr. Ak. Wien*, xxiv. 1865, p. 1, pl. i.
Cromileptes altivelis, part., *Day, Faun. Ind., Fish.* i. p. 441, fig. (1889).

D. X 18. A. III 10. Sc. 135–140 $\frac{20-22}{50-54}$; l. l. 70–73.

Depth of body 2½ to 3 times in total length, length of head 3 to 3⅓ times. Upper profile of head concave; snout as long as diameter of eye, which is 5 to 6 times in length of head; interorbital width 9 to 10 times in length of head; lower jaw slightly projecting; maxillary extending to below posterior third or posterior border of eye, the width of its distal extremity ⅖ to ¾ diameter of eye; præopercle finely serrated behind, with two or three slightly enlarged serræ at the angle; opercular spines feeble. Gill-rakers almost rudimentary, 16 on lower part of anterior arch. Dorsal spines gradually increasing in length to the last, which is about ½ length of head and ⅔ to ¾ length of longest soft rays. Pectoral nearly as long as head. Ventral ⅔ length of pectoral, reaching anus or not quite so far. Third anal spine a little longer than second, as long as second or third dorsal. Caudal rounded. Pale reddish brown; head, body, and fins covered with round blackish spots; in the young the spots are larger, fewer, and surrounded by a whitish ring.

Total length 350 millim.

Coasts of South-eastern Asia and N. Australia.

| | | |
|---|---|---|
| *a.* Ad. | China. | Gen. Hardwicke [P.]. |
| *b.* Yg., skin. | Pinang. | Dr. Cantor. |
| *c–d.* Yg. | Cebu, Philippines. | Dr. A. B. Meyer [C.]. |
| *e.* Ad. | Macassar. | Dr. A. B. Meyer [C.]. |
| *f.* Ad. | E. Indies. | |
| *g.* Yg., very bad state. | Port Essington. | Haslar Collection. |

## 26. PARANTHIAS.

Serranus, part., *Cuv. & Val.* ii. p. 210 (1828); *Günth. Cat.* i. p. 97 (1859).
Brachyrhinus (*non Laporte*), *Gill, Proc. Ac. Philad.* 1862, p. 249; *Poey, Ann. Lyc. N. Y.* x. 1891, p. 46; *Bleek. Arch. Néerl.* xi. 1876, p. 253; *Jord. & Gilb. Syn. Fish. N. Am.* p. 916 (1882).
Paranthias, *Guichen. Ann. Soc. Linn. Maine-et-Loire*, x. 1868, p. 87; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 381.

Body compressed; scales small, spinulose and ciliated. Lateral line complete, the tube with an ascending tubule, but a small portion of the scale exposed. Mouth moderate, protractile; maxillary exposed; jaws with villiform teeth and small canines in front; teeth on vomer and palatines in narrow bands; tongue smooth; head entirely scaly, including maxillary and mandible; præopercle serrated, without antrorse serræ on the lower border; opercle with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present. A single dorsal fin,

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with IX 18–20 rays, the spinous and soft portions equal in length, closely scaly at the base. Anal short, with III 9–10 rays. Caudal deeply emarginate. Pectorals obtuse-pointed, symmetrical, with 20 or 21 rays; a much developed dermal, scaly process above axilla. Ventrals a little behind pectorals, close together, with a strong spine. Frontal bones with anterior concavity for the reception of the posterior processes of the præmaxillaries, and with a knob-like process on each side behind the interorbital area; supraoccipital bone extending forward to between the postfrontal processes; supraoccipital and parietal crests produced on the frontals to between the orbits. Vertebræ 24 (10+14).

Coasts of Tropical America.

### 1. Paranthias furcifer.

*Parra, Descr. Piez. Hist. Nat.* p. 42, pl. xx. fig. 2 (1787).
Serranus furcifer, *Cuv. & Val.* ii. p. 264 (1828).
Serranus creolus, *Cuv. & Val. t. c.* p. 265; *Val., Cuv. It. A. Illustr.* pl. viii. fig. 1 (1836); *Günth.* i. p. 100 (1859); *Steind. Sitzb. Ak. Wien*, lxxii. i. 1876, p. 556.
Anthias furcifer, *Günth. t. c.* p. 91.
Corvina oxyptera, *Dekay, N. York Faun., Fish.* p. 77, pl. xcvi. fig. 96 (1842).
Serranus colonus, *Val. Voy. Venus, Zool.* p. 300, pl. ii. fig. 1 (1846); *Günth. t. c.* p. 101.
Brachyrhinus creolus, *Gill, Proc. Ac. Philad.* 1862, p. 249.
Brachyrhinus colonus, *Gill, l. c.* p. 250.
Paranthias furcifer, *Guichen. Ann. Soc. Linn. Maine-et-Loire*, x. 1868, p. 87; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 381.
Paranthias creolus, *Guichen. l. c.*
Brachyrhinus furcifer, *Poey, Ann. Lyc. N. Y.* x. 1871, p. 34; *Jord. & Gilb. Syn. Fish. N. Am.* p. 916 (1882)

D. IX 18–20. A. III 9–10. Sc. 120–135 $\frac{11-13}{30-38}$; l.l. 77–85.

Depth of body 3 to 3½ times in total length, length of head 3½ to 4 times. Snout as long as diameter of eye, which is 4 to 4½ times in length of head and nearly equals interorbital width; lower jaw projecting; maxillary extending to below centre or posterior third of eye, the width of its distal extremity ½ to ⅔ diameter of eye; præopercle finely serrated, serræ coarser at angle, which is rounded; opercular spines strong. Dorsal originating above axilla; spines increasing in length to the third, then equal and about ⅓ length of head; soft dorsal as deep as spinous. Pectoral as long as or slightly longer than head. Ventral about ⅔ length of pectoral, not reaching anus. Anal spines strong, first shortest, second and third equal and a little shorter than longest dorsals. Caudal crescentic, the lobes long. Red or reddish brown; three small, round, whitish or violet spots on each side of the back, above the lateral line; a more or less distinct dark streak along the dorsal fin.

Total length 240 millim.

Both coasts of Tropical America north of the Equator.



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| | | |
|---|---|---|
| *a*. Ad. | Cuba. | Zoological Society. |
| *b*. Hgr., skin. | W. Indies. | |
| *c–e*. Ad. | W. coast of America. | J. Goodridge, Esq. [C.]. Haslar Collection. |
| *f*. Hgr. | W. coast of America. | Museum Godeffroy. |
| *g*. Ad. | —— ? | |
| *h*. Ad., skel. | —— ? | |

## 27. SERRANUS.

Holocentrus, part., *Bloch, Ausl. Fische*, iv. p. 59 (1790).
Serranus, part., *Cuv. Règne An.* ii. p. 276 (1817), *and* 2nd ed. p. 138 (1829); *Cuv. & Val.* ii. p. 210 (1828); *Günth. Cat.* i. p. 97 (1859); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 44 (1877); *Jord. & Gilb. Syn. Fish. N. Am.* p. 532 (1882).
Plectropoma, part., *Cuv. & Val. t. c.* p. 387; *Günth. t. c.* p. 156; *Vaill. & Boc. l. c.* p. 94.
Centropristes, part., *Cuv. & Val.* iii. p. 36 (1829); *Günth. t. c.* p. 82; *Poey, Ann. Lyc. N. Y.* x. 1871, p. 51; *Vaill. & Boc. l. c.* p. 135; *Bleek. Arch. Néerl.* xi. 1876, p. 254.
Dules, part., *Cuv. & Val.* iii. p. 111; *Günth. t. c.* p. 266.
Prionodes, *Jenyns, Zool. Beagle, Fish.* p. 46 (1842); *Günth. t. c.* p. 96.
Diplectrum, *Holbr. Ichth. S. Carol.* p. 32 (1856); *Canestr. Verh. zool.-bot. Ges. Wien*, x. 1860, p. 306; *Poey, l. c.* p. 54; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 396.
Paralabrax, *Girard, Proc. Ac. Philad.* 1856, p. 131; *Günth. t. c.* p. 62; *Vaill. & Boc. l. c.* p. 67; *Jord. & Eigenm. l. c.* p. 386.
Atractoperca, *Gill, Proc. Ac. Philad.* 1861, p. 164.
Haliperca, *Gill, Proc. Ac. Philad.* 1862, p. 236; *Poey, l. c.* p. 52.
Mentiperca, *Gill, l. c.*; *Poey, l. c.* p. 54.
Hypoplectrus, *Gill, l. c.* p. 237; *Poey, l. c.* p. 55; *Jord. & Gilb. l. c.* p. 916; *Jord. & Eigenm. l. c.* p. 382.
Pseudoserranus, part., *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 687, *and Fische Roth. Meer.* p. 6 (1884).
Serranus, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 2, *and Arch. Néerl.* xi. 1876, p. 355; *Jord. & Eigenm. l. c.* p. 399.
Paraserranus, *Bleek. l. c.* 1873, p. 6, *and Atl. Ichth.* vii. p. 22 (1876).
Dules, *Bleek. Arch. Néerl.* xi. 1876, p. 254; *Steind. Sitzb. Ak. Wien*, xcvi. i. 1888, p. 58; *Jord. & Eigenm. l. c.* p. 394.
Hypoplectrus, part., *Bleek. l. c.* p. 255.
Cratinus, *Steind. Sitzb. Ak. Wien*, lxxxviii. i. 1878, p. 395; *Jord. & Eigenm. l. c.* p. 393.
Paracentropristes, *Klunz. Fische Roth. Meer.* p. 16; *Jord. & Eigenm. l. c.* p. 393.
Serranellus, *Jord. & Eigenm. l. c.* p. 404.

Body compressed; scales moderate or small, denticulated. Lateral line complete. Mouth rather large, protractile; maxillary exposed; villiform teeth in jaws, usually intermixed with more or less enlarged, canine-like teeth; teeth on vomer and palatines; tongue smooth; head partly scaled; præopercle serrated, the lower border smooth or with antrorse serræ; opercle with one, two, or three spines. Gill-membranes separate; seven branchiostegals (usually six in *S. auriga*); pseudobranchiæ present. Gill-rakers more or less elongate, usually slender. Dorsal fins confluent,

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with X 11–16 rays, the spinous and soft portions subequal in length. Anal short, with III 6–8 rays. Caudal truncate or emarginate. Pectorals obtuse-pointed or rounded, symmetrical or asymmetrical, with the upper rays longest; rays 15–18. Ventrals below pectorals, close together, with a strong spine. Præmaxillary processes not extending to the frontals; supraoccipital and parietal crests not produced on the frontals. Vertebræ 24 (10+14).

Coasts of Europe, Africa, and America.

Several species of this genus (*S. cabrilla, scriba, hepatus*) are well known to be normally hermaphrodite; but this is not generally the case, *S. novemcinctus* for instance, although very closely related to *S. cabrilla*, being unisexual.

Fig. 20.—Upper view of skull of *Serranus humeralis*.

*Synopsis of the Species.*

I. Smooth area of cranium not extending much beyond the orbits*, the supraoccipital and parietal bones extending forwards to a line connecting the postfrontal processes. Dorsal spines very unequal, the fin notched between the spinous and soft portions; soft dorsal with 12 to 15 rays. (PARALABRAX.)

A. Third dorsal spine not or but slightly longer than fourth; sc. 80–100 $\frac{11-18}{25-32}$; l. l. 64–75.

| | |
|---|---|
| Caudal crescentically emarginate; dorsal with 13 or 14 soft rays ..... | 1. *humeralis*, p. 278. |
| Caudal crescentically emarginate; dorsal with 12 soft rays ..... | 2. *castelnaui*, p. 279. |

* This character is easily ascertained without even removing the skin on the back of the head.



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Caudal truncate or slightly emarginate; dorsal with 13 or 14 soft rays ..... 3. *clathratus*, p. 279.

B. Third dorsal spine much longer than fourth.

Interorbital region closely scaled; sc. 110–120 $\frac{13-15}{30-35}$; l. l. 72–86 ..... 4. *nebulifer*, p. 280.

Interorbital region naked anteriorly; sc. 92–120 $\frac{15-18}{30-35}$; l. l. 66–80 ..... 5. *maculatofasciatus*, [p. 281.

II. Smooth area of cranium extending posteriorly to a line connecting the præopercular borders, the supraoccipital and parietal bones being short.

A. Serræ on lower border of præopercle small or absent. (SERRANUS.)

1. Dorsal with 13 to 16 soft rays; 70 scales or more in a longitudinal series.

*a*. Third to sixth dorsal spines prolonged into filaments. 6. *agassizii*, p. 281.

*b*. Dorsal spines not very unequal.

Sc. 105–125 $\frac{8-10}{30-37}$; l. l. 80–90; 14 or 15 gill-rakers on lower part of anterior arch ..... 7. *atricauda*, p. 282.

Sc. 87–100 $\frac{5-7}{22-28}$; l. l. 70–80; 13 to 16 gill-rakers ..... 8. *cabrilla*, p. 283.

Sc. 85–90 $\frac{6-7}{22-25}$; l. l. 65–77; 21 or 22 gill-rakers ..... 9. *novemcinctus*, p. 284.

Sc. 70–80 $\frac{6-9}{24-26}$; l. l. 65–75; 12 to 14 gill-rakers ..... 10. *scriba*, p. 285.

2. Dorsal with 11 or 12 (rarely 13) soft rays.

*a*. Præopercle not produced at the angle; dorsal spines strong.

*a*. Caudal truncate or slightly emarginate; lower jaw not or but slightly projecting.

* Interorbital region scaly; scales on opercle smaller than on body; sc. 50–57 $\frac{5-6}{18-20}$; l. l. 44–50. 11. *hepatus*, p. 286.

** Interorbital region naked; scales on opercle at least as large as on the body.

Sc. 45–50 $\frac{5-7}{14-17}$; l. l. 45–50; caudal truncate .. 12. *auriga*, p. 287.

Sc. 52 $\frac{5-6}{15}$; l. l. 50; caudal slightly emarginate. 13. *bulleri*, p. 288.

*β*. Caudal emarginate.

* Lower jaw not or but slightly projecting; fewer than 60 scales in a longitudinal series.

† Diameter of eye not 4 times in length of head.

Interorbital region naked; eye $3\frac{1}{6}$ to $3\frac{1}{3}$ times in length of head; depth of body $3\frac{1}{3}$ to 4 times in total length; sc. 50–55 $\frac{4-5}{15-17}$ .... 14. *sanctæ-helenæ*, [p. 289.

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Interorbital region naked; eye 3 times in length of head; depth of body 3 times in total length; sc. 50 $\frac{4}{12}$ ..... 15. *atrobranchus*, p. 289.

Interorbital region naked; eye 2¾ to 3 times in length of head; depth of body 3 to 3¼ times in total length; sc. 50–54 $\frac{5-6}{16-17}$ ..... 16. *phœbe*, p. 290.

Posterior half of interorbital region scaly .... 17. *fusculus*, p. 290.

†† Diameter of eye 4½ times in length of head; sc. 48 $\frac{5}{13}$. 18. *æquidens*, p. 291.

** Lower jaw projecting; snout not longer than diameter of eye.

Sc. 90–98 $\frac{9-11}{27-29}$ ..... 19. *tabacarius*, p. 291.

Sc. 90 $\frac{7}{27}$ ..... 20. *flavescens*, p. 292.

Sc. 67–70 $\frac{8}{23-24}$ ..... 21. *tigrinus*, p. 293.

*** Lower jaw very strongly projecting; snout longer than diameter of eye.

† Sc. 65–90 $\frac{8-11}{18-29}$.

Eye 3½ times in length of head ..... 22. *lucioperca nus*, p. 294.

Eye 4 times in length of head ..... 23. *stilbostigma*, p. 294.

†† Sc. 50 $\frac{5}{16}$ ..... 24. *psittacinus*, p. 295.

*b*. Præopercle more or less produced at the angle, which is armed with enlarged diverging spines; dorsal and anal spines rather feeble; caudal crescentically emarginate.

*a*. 12 to 15 gill-rakers on lower part of anterior arch.

Dorsal fin not notched; præopercle with two clusters of divergent spines in the adult; sc. 85–90 $\frac{7-9}{22-23}$; l. l. 54–60 ..... 25. *radians*, p. 295.

Dorsal fin not notched; præopercle with a single group of spines; sc. 65–70 $\frac{5-7}{17-20}$; l. l. 53–55 ..... 26. *conceptionis*, p. 296.

Dorsal fin notched between the spinous and soft portions; præopercle with a single group of spines; sc. 60–70 $\frac{6-8}{18-21}$; l. l. 48–55 .... 27. *radialis*, p. 297.

*β*. 25 gill-rakers on lower part of anterior arch; sc. 75; l. l. 52. 28. *sciurus*, p. 298.

B. Serræ on lower border of præopercle strong; body short, deep; dorsal with 13 to 15 soft rays. (HYPOPLECTRUS.)

Caudal slightly emarginate; sc. 60 $\frac{6}{-}$; l. l. 46.. 29. *lamprurus*, p. 298.

Caudal slightly emarginate; sc. 80–92 $\frac{8-10}{-}$; l. l. 52–60 ..... 30. *unicolor*, p. 299.

Caudal forked, crescent-shaped ..... 31. *gemma*, p. 301.

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I. PARALABRAX, Gir.—Smooth area of cranium not extending much beyond the orbits, the supraoccipital and parietal bones extending forwards to a line connecting the postfrontal processes. Lower border of præopercle feebly serrated.

### 1. Serranus humeralis.

Serranus humeralis, *Cuv. & Val.* ii. p. 246 (1828); *Guichen. in Gay, Hist. Chile, Zool.* ii. p. 149 (1854); *Günth.* i. p. 104 (1859); *Steind. Sitzb. Ak. Wien*, lvii. i. 1868, p. 967; *Kner, op. cit.* lviii. i. 1869, p. 296; *Günth. Proc. Zool. Soc.* 1877, p. 68; *Steind. Sitzb. Ak. Wien*, lxxviii. i. 1879, p. 400.

Serranus albomaculatus, *Jenyns, Zool. Beagle, Fish.* p. 3, pl. ii. (1842); *Günth.* i. p. 105; *Steind. Sitzb. Ak. Wien*, lxxii. i. 1875, p. 554, pl. i. fig. 2, and lxxviii. i. 1879, p. 400.

Serranus semifasciatus, *Guichen. l. c.* p. 151, pl. i. bis, fig. 2.

Percichthys godeffroyi, *Günth. Journ. Mus. Godeffr.* i. H. 2, 1873, p. 97.

Paralabrax albomaculatus, *Jord. & Bollm. Proc. U.S. Nat. Mus.* xii. 1889, p. 181; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 389.

Paralabrax humeralis, *Jord. & Eigenm. l. c.*

D. X 13–14. A. III 7. Sc. 85–100. $\frac{13-18}{30-32}$; l. l. 64–70.

Depth of body 3⅓ to 4 times in total length, length of head 2⅔ to 3⅕ times. Snout longer than diameter of eye, which is 5 to 6 times in length of head and nearly equals interorbital width; lower jaw projecting; canine teeth feebly enlarged or absent; maxillary extending to below centre or posterior third of eye, the width of its distal extremity ½ to ⅔ diameter of eye; snout naked; interorbital region naked or partially scaly; cheeks and opercles scaly; præopercle finely serrated, somewhat produced and rounded at the angle in the adult, the serræ of the lower border directed forwards; middle opercular spine strong, upper and lower small or absent. Gill-rakers long, 18 or 19 on lower part of anterior arch. Dorsal originating above base of pectoral; first and second spines short, third or fourth longest, ⅖ to ½ length of head and longer than the soft rays, tenth longer than ninth; a deep notch between spinous and soft portions of the fin. Pectoral asymmetrical, rounded, upper rays longest, ⅗ to ⅔ length of head, longer than ventrals. Second and third anal spines equal, about as long as sixth dorsal. Caudal crescentically emarginate. Brown, uniform or with a lateral series of light spots; young with six or seven rather indistinct dark vertical bars, and round light spots on the head and vertical fins; ventrals blackish.

Total length 450 millim.

Pacific coast of America, from Panama to Chili.

| | | |
|---|---|---|
| *a*. Ad. | Chili. | Government of Chili [P.]. |
| *b*. Yg. | Chili. | Museum Godeffroy. |
| *c*. Hgr. | Iquique. | Museum Godeffroy. (Type of *Percichthys godeffroyi*.) |

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| | | |
|---|---|---|
| *d.* Hgr. | Cinchas Ids., Peru. | Museum Godeffroy. |
| *e.* Hgr., skel. | Cinchas Ids. | Museum Godeffroy. |

### 2. Serranus castelnaui *.

Centropristis nebulosus, *Castaln. Anim. Nouv. Amér. Sud, Poiss.* p. 5, pl. i. fig. 4 (1855).

Serranus castelnaui, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 409.

D. X 12. A. III 7? Sc. 80 $\frac{11}{25}$; l. l. 67.

Depth of body about $3\frac{1}{2}$, length of head 3 times in total length. Diameter of eye equal to interorbital width, a little shorter than snout, about $\frac{1}{6}$ length of head; lower jaw projecting, with a few very small, almost obsolete canines on each side; maxillary extending to below centre of eye, the width of its distal extremity $\frac{1}{2}$ diameter of eye; snout and interorbital region naked; cheeks and opercles scaly; præopercle serrated on its posterior and lower border; a very strong opercular spine. Dorsal originating above base of pectoral; first and second spines short, third and fourth longest, about $\frac{2}{3}$ length of head, ninth shorter than tenth. Pectoral about $\frac{2}{3}$ length of head, asymmetrical, upper rays longest. Caudal deeply notched. Slaty grey; dorsal fin with yellow and red spots.

Total length 290 millim.

Rio Janeiro.

### 3. Serranus clathratus.

Labrax clathratus, *Girard, Proc. Ac. Philad.* 1854, p. 143.

Paralabrax clathratus, *Girard, Proc. Ac. Philad.* 1856, p. 132, *and Rep. U.S. Explor. R. R.* x. pt. iv. p. 83, pl. xii. figs. 5-8 (1859); *Günth.* i. p. 63 (1859); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 390.

Atractoperca clathrata, *Gill, Proc. Ac. Philad.* 1861, p. 165.

Serranus clathratus, *Steind. Sitz. Ak. Wien*, lxxii. i. 1875, p. 29; *Jord. & Gilb. Syn. Fish. N. Am.* p. 535 (1882).

D. X 13–14. A. III 7. Sc. 90–100 $\frac{12-15}{28-32}$; l. l. 68–75.

Depth of body 3 to $3\frac{1}{2}$ times in total length, length of head 3 times. Snout longer than diameter of eye, which is $5\frac{1}{2}$ to $6\frac{1}{2}$ times in length of head in the adult; interorbital space broad, 4 to $4\frac{1}{2}$ times in length of head; lower jaw projecting; canine teeth feebly enlarged; maxillary extending to below centre of eye; snout naked; interorbital region naked or with a few scales; cheeks and opercles scaly; præopercle finely serrated, rounded at the angle, the serræ of the lower border directed forwards; middle opercular spine strong, upper and lower small or absent. Gill-rakers long, 20 to 24 on lower part of anterior arch. Dorsal originating above base of pectoral; first and second spines short, third or fourth

* Described from the type specimen, a skin (Paris Mus. no. 7821).

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longest, $\frac{2}{5}$ to $\frac{1}{2}$ length of head and longer than the soft rays, tenth longer than ninth; a deep notch between spinous and soft portions of the fin. Pectoral asymmetrical, rounded, upper rays longest, $\frac{2}{3}$ to $\frac{3}{4}$ length of head, longer than ventrals. Second and third anal spines subequal in length, second strongest, about as long as last dorsal spine. Caudal truncate or very feebly emarginate. Brown or olive above, silvery grey beneath; more or less distinct darker or lighter spots and bars may be present on the back and sides; fins brownish, soft dorsal with more or less distinct light spots.

Total length 550 millim.

Coast of California, from San Francisco to the Cerros Islands.

| | | |
|---|---|---|
| *a*. Hgr. | San Francisco. | Dr. W. Ayres [P.]. |
| *b–e*. Ad., hgr., & yg. | San Diego. | Prof. Eigenmann [C.]. |
| *f*. Hgr. | Santa Cruz Id. | Smithsonian Institution. |
| *g*. Hgr. | San Pedro, California. | Smithsonian Institution. |
| *h*. Yg. | California. | Mus. of Comp. Zoology. |

### 4. Serranus nebulifer.

Labrax nebulifer, *Girard, Proc. Ac. Philad.* 1854, p. 142.

Paralabrax nebulifer, *Girard, Proc. Ac. Philad.* 1856, p. 132, *and Rep. U.S. Explor. R. R.* x. pt. iv. p. 83, pl. xii. figs. 1–4 (1859); *Günth.* i. p. 62 (1859); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 388.

Serranus nebulifer, *Steind. Sitzb. Ak. Wien*, lxxii. i. 1875, p. 29; *Jord. & Gilb. Syn. Fish. N. Am.* p. 536 (1882).

D. X 13–15. A. III 7. Sc. 110–120 $\frac{13-15}{30-35}$; l. l. 72–86.

Depth of body $3\frac{1}{3}$ to $3\frac{3}{4}$ times in total length, length of head $2\frac{3}{4}$ to 3 times. Snout longer than diameter of eye, which is 5 to 6 times in length of head and nearly equals interorbital width in the adult; lower jaw projecting; canine teeth feebly enlarged or absent; maxillary extending to below centre of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye: snout naked; interorbital space closely scaly; cheeks and opercles scaly; præopercle serrated, rounded at the angle, the serræ on the lower border directed forwards; middle opercular spine strong, upper and lower small or absent. Gill-rakers long, 18 to 20 on lower part of anterior arch. Dorsal originating above base of pectoral; first and second spines short, third longest, $\frac{1}{2}$ to $\frac{2}{3}$ length of head, and much longer than the soft rays, tenth a little longer than ninth; a deep notch between spinous and soft portions of the fin. Pectoral asymmetrical, rounded, upper rays longest, $\frac{2}{3}$ to $\frac{3}{4}$ length of head, longer than ventrals. Second and third anal spines subequal in length, second strongest, about as long as the last dorsal. Caudal feebly emarginate. Brown or olive above, uniform or with irregular pale and dark mottlings or dark spots, and usually with faint traces of five vertical dark bars; an oblique dark streak, directed backwards, below the

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eye; ventrals and vertical fins brown, spinous dorsal blackish in front.

Total length 320 millim.

Coast of Southern California.

| | | |
|---|---|---|
| *a–c.* Ad. & hgr. | San Diego. | Prof. Eigenmann [C.]. |
| *d–e.* Hgr. & yg. | San Diego. | Mus. of Comp. Zoology. |
| *f–g.* Hgr. | San Diego. | Smithsonian Institution. |
| *h.* Yg. | —— ? | Museum Godeffroy. |

### 5. Serranus maculatofasciatus.

Serranus maculatofasciatus, *Steind. Sitzb. Ak. Wien*, lvii. i. 1868, p. 969, pl. ii.; *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 72, pl. iv. fig. 1 (1877); *Jord. & Gilb. Proc. U.S. Nat. Mus.* iv. 1881, p. 46, *and Syn. Fish. N. Am.* p. 536 (1882).

Serranus acanthophorus, *Bocourt, Ann. Sc. Nat.* (5) x. 1868, p. 223.

Paralabrax maculatofasciatus, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 388.

D. X 14. A. III 7. Sc. 92–120 $\frac{15-18}{30-35}$; l. l. 66–80.

Apart from the coloration, differs from *S. nebulifer* merely in having the anterior half of the interorbital space scaleless, and the gill-rakers shorter and fewer, viz. 13 or 14 on lower part of anterior arch. Coloration as in *S. nebulifer*, but head, body, and caudal fin all covered with round dark brown spots.

Total length 380 millim.

Coast of California and Mexico, from San Francisco to Mazatlan.

| | | |
|---|---|---|
| *a–b.* Ad. & yg. | San Diego. | Prof. Eigenmann [C.]. |
| *c.* Ad. | San Diego. | Mus. of Comp. Zoology. |
| *d.* Ad. | San Diego. | Smithsonian Institution. |
| *e–g.* Yg. | San Francisco. | |

II. SERRANUS, Cuv.—Smooth area of cranium extending posteriorly to a line connecting the præopercular borders, the supra-occipital and parietal bones being short. Lower border of præopercle smooth or feebly serrated.

### 6. Serranus agassizii.

Cratinus agassizii, *Steind. Sitzb. Ak. Wien*, lxxviii. i. 1878, p. 395; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 394.

D. X 13. A. III 7. Sc. 80 $\frac{9-10}{25}$; l.l. 60–63.

Depth of body $3\frac{3}{4}$ to 4 times in total length, length of head $2\frac{1}{2}$ times. Snout longer than diameter of eye, which is $7\frac{1}{2}$ times in length of head and exceeds interorbital width; lower jaw strongly projecting; canine teeth moderate; maxillary extending to below centre of eye; head scaly above and on the sides, snout and forehead naked in the adult; præopercle finely serrated. First and second dorsal spines short, third to sixth produced into long flexible fila-

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ments, about $\frac{1}{3}$ total length; a deep notch between spinous and soft portions of the fin. Caudal slightly emarginate. Yellowish or greenish grey, with darker clouds or obscure cross-bars, which disappear in spirit.

Total length 450 millim.

Galapagos Islands.

### 7. Serranus atricauda.

Serranus cabrilla (*non L.*), *Guichen. Explor. Sc. Alg., Poiss.* p. 33, pl. i. (1850).
Serranus cabrilla, part., *Günth.* i. p. 106 (1859).
Serranus scriba (*non L.*), *Capello, Jorn. Sc. Lisb.* i. 1867, p. 243.
Serranus atricauda, *Günth. Ann. & Mag. N. H.* (4) xiii. 1874, p. 230; *Hilgend. Arch. f. Nat.* 1888, p. 206; *Steind. Sitzb. Ak. Wien,* c. i. 1891, p. 351.

D. X 15–16. A. III 7–8. Sc. 105–125 $\frac{8-10}{30-37}$; l.l. 80–90.

Depth of body $3\frac{1}{3}$ to $3\frac{1}{2}$ times in total length, length of head $2\frac{3}{4}$ to 3 times. Snout longer than diameter of eye, which is 4 to 6 times in length of head; interorbital width 5 to 6 times in length of head; lower jaw projecting, with strong canine teeth on the sides; maxillary extending to below centre or posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye; snout and vertex scaleless, præopercle and opercle scaly; as many as 17 to 20 series of scales between eye and angle of præopercle; præopercle with rounded, finely serrated border, the serræ somewhat coarser at the angle, obsolete below; opercular spines strong, median longest and extending farthest. Gill-rakers rather long, 14 or 15 on lower part of anterior arch. Dorsal originating above extremity of longest opercular spine; first and second spines shortest, the rest not very unequal in length and not separated from the soft rays by a notch; fifth spine nearly as long as longest soft ray, and $\frac{1}{3}$ to $\frac{2}{5}$ length of head. Pectoral obtusely pointed, $\frac{2}{3}$ to $\frac{3}{4}$ length of head, longer than ventrals. Second and third anal spines equal, longer than second dorsal. Caudal truncate or feebly emarginate. Lateral line forming an angle below the last dorsal rays. Brown; on each side, below the lateral line, a series of four or five large square blackish blotches, between each two of which is a blackish vertical bar; two or three dark oblique streaks on the cheek; vertical fins dark, with bright dots; ventrals dark; distal half of anal and corners of caudal black.

Total length 290 millim.

Coasts of Portugal, the Azores, Madeira, Canary Islands, Morocco, and Algeria.

| | | | |
|---|---|---|---|
| *a*. Yg. | Azores. | Madame Pfeiffer [C.]. | (Types.) |
| *b–d*, *e–g*, *h–i*. Ad. | Madeira. | Rev. R. T. Lowe [P.]. | |
| *k*. Ad. | Madeira. | | |
| *l*, *m*, *n*. Ad. & hgr., skins. | Santa Cruz, Teneriffe. | | |
| *o*. Hgr. | Mogador. | Prof. Rein [P.]. | |
| *p*. Ad. | Grand Canary. | Capt. Milner [P.]. | |

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### 8. Serranus cabrilla.

Perca cabrilla, *Linn. S. N.* i. p. 488 (1766).
Holocentrus argentinus, *Bloch, Ausl. Fische*, iv. p. 73, pl. ccxxxv. fig. 2 (1790).
Lutjanus serran, *Lacép. Poiss.* iv. p. 205 (1802).
Bodianus hiatula, *Lacép. t. c.* p. 297.
Holocentrus flavus, *Risso, Ichth. Nice*, p. 293 (1810).
Holocentrus serran, *Risso, l. c.* p. 294.
Serranus cabrilla, *Risso, Eur. Mér.* iii. p. 375 (1826); *Cuv. & Val.* ii. p. 223, pl. xxix. (1828); *Yarr. Brit. Fish.* i. p. 9, fig. (1836); *Nordm. in Demid. Voy. Russ. Mér.* iii. p. 367 (1846); *Costa, Faun. Nap., Pesci* (1850); *Couch, Brit. Fish.* i. p. 195, pl. xlii. (1862); *Peters, Mon. Berl. Ac.* 1865, p. 101; *Canestr. Faun. Ital., Pesci*, p. 75 (1874); *Day, Fish. Gr. Brit.* p. 14, pl. iv. (1880); *Moreau, Poiss. Fr.* ii. p. 360 (1881); *Vincig. Ann. Mus. Genova*, xviii. 1883, p. 491; *Doderl. Man. Ittiol. Mediterr.* iv. p. 45 (1889); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 411; *Steind. Sitzb. Akad. Wien*, c. i. 1891, p. 349; *Osorio, Jorn. Sc. Lisb.* (2) ii. 1891, p. 99.
Serranus flavus, *Risso, l. c.* p. 376.
Perca channus, *Couch, Mag. N. H.* v. 1832, p. 19, fig.
Perca mormyrus, *Gronow, Cat.* p. 109 (1854).
Centropristis præstigiator, spec. *a–b* (*non Poey*), *Günth.* i. p. 85 (1859)*.
Serranus cabrilla, part., *Günth. t. c.* p. 106.
Pseudoserranus bicolor, *Kossm. & Räub. Ergebn. Reise Roth. Meer.* p. 7, pl. i. fig. 1 (1877).
Pseudoserranus cabrilla, *Klunz. Fische Roth. Meer.* p. 7, pl. ii. figs. 4 & 5 (1884).

D. X 13–15. A. III 7–8. Sc. 85–100 $\frac{5-7}{22-28}$; l.l. 70–80.

Depth of body $3\frac{1}{4}$ to $3\frac{3}{4}$ times in total length, length of head $2\frac{3}{4}$ to 3 times. Snout longer than diameter of eye, which is 4 to 6 times in length of head; interorbital width 5 to 6 times in length of head; lower jaw projecting, with strong canine teeth on the sides; maxillary extending to below centre or posterior border of eye, the width of its distal extremity about half diameter of eye (more in old specimens); snout and vertex scaleless, præopercle and opercle scaly; præopercle finely serrated, the serræ somewhat coarser at the angle, usually obsolete on the lower border; opercular spines strong, middle largest and extending farthest. Gill-rakers rather long, 13 to 16 on lower part of anterior arch. Dorsal originating above extremity of longest opercular spine; first and second spines shortest, the rest not very unequal in length and not separated from the soft rays by a notch; fifth spine as long as or a little shorter than longest soft rays, which measure about $\frac{2}{3}$ length of head. Pectoral obtusely pointed, $\frac{2}{3}$ to $\frac{3}{4}$ length of head, longer than ventrals. First and second anal spines equal, longer than second dorsal spine. Caudal feebly emarginate. Lateral line

* The description is taken from Poey's. The two specimens (*η–θ*), which are young *S. cabrilla*, have D. X 13; sc. 87–90 $\frac{6-7}{25-27}$; l.l. 70.

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forming an angle below the last dorsal rays. Yellowish grey or pale brown above, with or without eight or nine darker cross-bands on the back, and with two or three yellow or red stripes along the sides; sides of head with oblique red stripes; soft dorsal, anal, and caudal with bright (lilac) dots.

Total length 360 millim.

Mediterranean; Atlantic coasts of Europe and Africa, from the English Channel to the Canary Islands; Red Sea.

| | | |
|---|---|---|
| *a*. Ad. | London Market. | Messrs. J. & C. Grove [P.]. |
| *b*. Ad., stffd. | Plymouth. | H. F. Spencer, Esq. [P.]. |
| *c*, *d*, *e*. Ad. & hgr., skins. | Plymouth. | Yarrell Collection. |
| *f*, *g*. Ad., skins. | Cawsand, Devonshire. | Yarrell Collection. |
| *h*. Ad. | Mevagissey, Cornwall. | F. Day, Esq. [P.]. |
| *i*. Ad. | Cornish coast. | T. H. Powell, Esq. [P.]. |
| *k*–*o*. Ad., hgr., & yg. | Channel Islands. | Dr. Günther [P.]. |
| *p*. Hgr. | Lisbon. | C. Hough, Esq. [P.]. |
| *q*–*s*. Hgr. | Gibraltar. | P. L. Sclater, Esq. [P.]. |
| *t*–*u*. Ad. & yg. | Cannes. | Dr. T. Günther [P.]. |
| *v*. Ad. | Dalmatia. | |
| *w*–*α*. Ad. & hgr. | Constantinople. | Dr. Dickson [P.]. |
| *β*–*ε*, *ζ*–*η*. Ad. & hgr. | Propontis. | Dr. Millingen [P.]. |
| *θ*. Hgr., skin. | Mediterranean. | Gronow Collection. (Type of *Perca mormyrus*.) |
| *ι*. Yg. | Madeira. | Rev. R. T. Lowe [P.]. |
| *κ*–*λ*. Yg. | —— ? | Haslar Collection. |
| *μ*. Skeleton. | England. | |
| *ν*. Skull. | —— ? | |

### 9. Serranus novemcinctus.

Serranus cabrilla, part., *Günth.* i. p. 106 (1859); *Steind. Sitzb. Ak. Wien*, lvi. i. 1867, p. 611.

Serranus novemcinctus, *Kner*, *Novara*, *Fische*, p. 17, pl. ii. fig. 1 (1865); *Vaill. Miss. Sc. Mex.*, *Poiss.* p. 63 (1877); *Sauv. Arch. Zool. Exper.* viii. 1880, p. 7.

D. X 14. A. III 7. Sc. 85–90 $\frac{6-7}{22-25}$; l. l. 65–77.

Depth of body 3 to 3½ times in total length, length of head 3 to 3⅕ times. Snout longer than diameter of eye, which is 4 to 5½ times in length of head; interorbital width 5½ times in length of head; lower jaw projecting, with strong canine teeth on the sides; maxillary extending to below centre or posterior third of eye, the width of its distal extremity ½ to ¾ diameter of eye; snout and vertex naked, præopercle and opercle scaly; præopercle finely serrated, the serræ somewhat coarser at the angle and obsolete on the lower border; opercular spines strong, middle largest. Gill-rakers rather long, 21 or 22 on lower part of anterior arch. Dorsal originating above extremity of longest opercular spine or above axilla; first and second spines shortest, the rest not very unequal in length and not separated from the soft rays by a notch; fifth spine as long

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as or a little shorter than longest soft rays. Pectoral obtusely pointed, $\frac{2}{3}$ length of head, longer than ventral. First and second anal spines equal, longer than second dorsal spine. Caudal feebly emarginate. Brown, with nine or ten darker cross-bands.

Total length 170 millim.

Cape of Good Hope and St. Paul Island, Indian Ocean.

| | | |
|---|---|---|
| *a*. Ad. | St. Paul Id. | Paris Museum [E.]. |
| *b–d*. Hgr. & yg. | St. Paul Id. | J. Macgillivray, Esq. [C.]. Lords of the Admiralty [P.]. |

### 10. Serranus scriba.

Perca scriba, *Linn. S. N.* i. p. 486 (1766).
Perca marina, part., *Linn. t. c.* p. 483.
Holocentrus maroccanus, *Bl. Schn. Syst.* p. 320 (1801).
Lutjanus scriptura, *Lacép. Poiss.* iv. p. 229 (1802).
Holocentrus marinus, *Lacép. t. c.* p. 376; *Risso, Ichth. Nice*, p. 291 (1810).
Holocentrus argus, *Spinola, Ann. Mus.* x. 1807, p. 372.
Lutianus crapa, *Rafin. Caratt. N. An. Sicil.* p. 52 (1810).
Lutianus mediterraneus, *Rafin. Ind. Ittiol. Sicil.* p. 18 (1810).
Serranus marinus, *Martens, Reise Vened.* ii. p. 425 (1824).
Serranus argus, *Risso, Eur. Mér.* iii. p. 373 (1826).
Serranus scriba, *Risso, l. c.* p. 374; *Cuv. & Val.* ii. p. 214, pl. xxviii. (1828); *Nordm. in Demid. Voy. Russ. Mér.* iii. p. 366, pl. ii. fig. 1 (1840); *Costa, Faun. Nap., Pesci* (1850); *Günth.* i. p. 103 (1859); *Steind. Sitzb. Ak. Wien*, lvi. 1867, p. 609; *Canestr. Faun. Ital., Pesci*, p. 74 (1874); *Steind. Denkschr. Ak. Wien*, xliv. 1881, p. 20; *Moreau, Poiss. Fr.* ii. p. 355 (1881); *Vinciq. Ann. Mus. Genova*, xviii. 1883, p. 491; *Doderl. Mun. Ittiol. Mediterr.* iv. p. 39 (1889); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 410.
Serranus gymnopareius, *Cuv. & Val. t. c.* p. 248*; *Günth. t. c.* p. 105.
Serranus papilionaceus, *Cuv. & Val.* viii. p. 471 (1831); *Val. in Webb & Berthel. Iles Canar., Ichth.* p. 7 (1843); *Günth. t. c.* p. 114.
Serranus maroccanus, *Peters, Mon. Berl. Ac.* 1865, p. 99.
Bodianus gymnopareius, *Jord. & Eigenm. l. c.* p. 378.

D. X 14–15. A. III 7–8. Sc. 70–80 $\frac{6-8}{24-26}$; l. l. 65–75.

Depth of body $2\frac{3}{4}$ to $3\frac{1}{4}$ times in total length, length of head $2\frac{2}{3}$ to 3 times. Profile of nape sometimes concave; snout pointed, longer than diameter of eye, which is 5 to 6 times in length of head; interorbital width 5 to 6 times in length of head; lower jaw projecting, with more or less developed canine teeth on the sides; maxillary extending to below centre or posterior border of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; snout and vertex scaleless, præopercle and opercle scaly; præopercle with rounded, finely serrated border, the serræ somewhat coarser at the angle, obsolete below; opercular spines strong, middle largest and extending farthest, nearer lower than upper. Gill-rakers moderate, 12 to 14 on lower part of anterior arch. Dorsal

* Type (Paris Mus. no. 7071) examined.

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originating above extremity of longest opercular spine; first and second spines shortest, the rest not very unequal in length and not separated from the soft rays by a notch; fifth spine as long as or a little shorter than longest soft rays, which measure $\frac{2}{5}$ to $\frac{1}{2}$ length of head. Pectoral obtusely pointed, $\frac{3}{4}$ to $\frac{4}{5}$ length of head, longer than ventral. Second and third anal spines equal and longer than second dorsal. Caudal truncate. Lateral line forming an angle below the last dorsal rays. Olive or brown above, with five or six dark cross-bands on the body, some of which may split into two below the lateral line; or these bands may coalesce to two, one below the spinous dorsal, the other below the soft; a dark stripe on each side of the head, passing through the eye; more or less distinct dark (blue) vermiculations on top of head; vertical fins usually with bright (red) dots.

Total length 210 millim.

Mediterranean; Atlantic coasts, from South Portugal to Senegambia and the Canary Islands.

| | | |
|---|---|---|
| *a–b*. Ad. & yg. | Mediterranean. | Haslar Collection. |
| *c*. Ad. | Dalmatia. | |
| *d*. Hgr. | Sicily. | W. Swainson, Esq. [P.]. |
| *e*. Yg. | Naples. | F. Day, Esq. [P.]. |
| *f*. Ad. | Gibraltar. | P. L. Sclater, Esq. [P.]. |
| *g*. Ad. | Lanzarote. | Rev. R. T. Lowe [P.]. |
| *h*. Ad. | Grand Canary. | Capt. Milner [P.]. |
| *i*. Ad. | Canary Ids. | Milan Museum [E.]. |
| *k*. Skeleton. | Bay of Naples. | S. P. Pratt, Esq. [P.]. |

### 11. Serranus hepatus.

Labrus hepatus, *Linn. S. N.* i. p. 474 (1766).
Labrus, sp., *Brünnich, Spol. Mass.* p. 98 (1768).
Holocentrus striatus, *Bloch, Ausl. Fische,* iv. p. 71, pl. ccxxxv. fig. 1 (1790).
Labrus spalatensis, *Bl. Schn. Syst.* p. 256 (1801).
Lutjanus adriaticus, *Lacép. Poiss.* iv. p. 222 (1802).
Holocentrus triacanthus, *Lacép. t. c.* p. 377.
Holocentrus siagonotus, *Delaroche, Ann. Mus.* xiii. 1809, p. 352, pl. xxii. fig. 8.
Holocentrus hepatus, *Risso, Ichth. Nice,* p. 292 (1810).
Serranus hepatus, *Risso, Eur. Mér.* iii. p. 377 (1826); *Cuv. & Val.* ii. p. 231 (1828); *Bonap. Icon. Faun. Ital.* iii. (1832); *Costa, Faun. Nap., Pesci,* p. —, pl. vii. (1850); *Canestr. Faun. Ital., Pesci,* p. 75 (1874); *Moreau, Poiss. Fr.* ii. p. 363, fig. (1881); *Vincig. Ann. Mus. Genova,* xviii. 1883, p. 489; *Doderl. Man. Ittiol. Mediterr.* iv. p. 50 (1889).
Holocentrus adriaticus, *Nardo, Prodr. Adriat. Ichth.* pp. 14, 21 (1827).
Centropristis hepatus, *Günth.* i. p. 84 (1859).
Paracentropristis hepatus, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 395.

D. X 11–12. A. III 6–7. Sc. 50–57 $\frac{5-6}{18-20}$; l. l. 44–50.

Depth of body $2\frac{1}{2}$ to 3 times in total length, length of head $2\frac{3}{4}$

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to 3 times. Snout as long as or a little shorter than diameter of eye, which is $3\frac{1}{2}$ to 4 times in length of head; interorbital width $4\frac{1}{2}$ to $5\frac{1}{2}$ times in length of head; lower jaw not projecting, with more or less developed canine teeth on the sides; maxillary extending to below anterior third or centre of eye, the width of its distal extremity $\frac{2}{5}$ to $\frac{1}{2}$ diameter of eye; head scaly to between the nostrils; præopercle with rounded, serrated border, the serræ usually somewhat coarser at the angle; median opercular spine strong. Gill-rakers rather long, 13 to 15 on lower part of anterior arch. Dorsal originating above extremity of longest opercular spine; the spines gradually increasing in length to the fourth, which equals the longest soft rays and nearly half length of head; no notch between the spinous and soft portions of the fin. Pectoral rounded, longer than ventral. Second anal spine slightly longer than third, as long as second dorsal spine. Caudal truncate or slightly emarginate. Lateral line forming an angle on caudal peduncle. Pale brown or pinkish, with five more or less distinct dark cross-bands, the fourth broadest and bifurcating above; a round black spot on anterior portion of soft dorsal, sometimes continued as a bar along the base of the fin; ventrals and base of anal blackish.

Total length 110 millim.

Mediterranean.

| | | |
|---|---|---|
| *a*. Hgr. | Mediterranean. | Haslar Collection. |
| *b*. Hgr. | Naples. | F. Day, Esq. [P.]. |
| *c–d*. Ad. & hgr. | Dalmatia. | |
| *e–f*. Ad. | Constantinople. | Dr. Dickson [P.]. |

### 12. Serranus auriga.

Dules auriga, *Cuv. & Val.* iii. p. 112, pl. li. (1829); *Dekay, N. Y. Faun., Fish.* p. 34, pl. xix. fig. 34 (1842); *Jenyns, Zool. Beagle, Fish.* p. 16 (1842); *Günth.* i. p. 266 (1859); *Jord. & Gilb. Syn. Fish. N. Am.* p. 542 (1882); *Steind. Sitzb. Ak. Wien*, xcvi. i. 1888, p. 57, pl. i. fig. 2; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 394.

Dules flaviventris, *Cuv. & Val. t. c.* p. 113; *Günth. t. c.* p. 267.

Centropristis brasiliensis, *Brisout de Barnev. Rev. Zool.* 1847, p. 131.

Centropristis dispilurus, *Günth. Proc. Zool. Soc.* 1867, p. 99.

Centropristis subligarius, *Cope, Proc. Ac. Philad.* 1870, p. 120.

Serranus subligarius, *Jord. & Gilb. Proc. U.S. Nat. Mus.* v. 1882, p. 274, *and op. cit.* pp. 535 & 917; *Jord. & Eigenm. l. c.* p. 405.

Serranus dispilurus, *Jord. Proc. U.S. Nat. Mus.* ix. 1886, p. 27.

Serranus brasiliensis, *Jord. t. c.* p. 533; *Jord. & Eigenm. Proc. U.S. Nat. Mus.* x. 1887, p. 269.

Prionodes brasiliensis, *Jord. & Bollm. Proc. U.S. Nat. Mus.* xii. 1889, p. 159.

Serranus flaviventris, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 406.

D. X 12–13. A. III 7. Sc. 45–50 $\frac{5\text{–}7}{14\text{–}17}$; l. l. 45–50.

Depth of body $2\frac{2}{3}$ to 3 times in total length, length of head $2\frac{3}{4}$ to $2\frac{4}{5}$ times. Snout as long as or a little shorter than diameter of eye,

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which is $3\frac{1}{2}$ to $4\frac{1}{2}$ times in length of head; interorbital width 5 times in length of head; lower jaw feebly projecting, with feeble canine teeth on the sides; maxillary extending to below centre or posterior third of eye, the width of its distal extremity $\frac{1}{3}$ to $\frac{2}{5}$ diameter of eye; snout and top of head naked, cheeks and opercles scaly, the scales on the opercles large, in five vertical series; præopercle finely serrated, the serræ coarser at the angle, obsolete on the lower border; middle opercular spine strong. Gill-rakers moderate, 11 or 12 on lower part of anterior arch. Dorsal originating above base of pectoral; the spines increasing in length to the third, fourth, or fifth; third spine much prolonged and whip-like in the male. Pectoral a little shorter than head, much longer than ventral. Second and third anal spines equal or second longest. Caudal truncate. Brownish, with three to seven more or less distinct darker vertical bars, which extend on the dorsal fin; a large yellowish blotch on the belly; females with two round blackish spots on base of caudal.

Total length 125 millim.

Atlantic coast of America, from the United States to Brazil.

| | | |
|---|---|---|
| *a*. ♂. | Bahia. | |
| *b–c*. ♀. | Trinidad. | (Types of *C. dispilurus*.) |

### 13. Serranus bulleri. (Plate X.)

D. X 12. A. III 7. Sc. 52 $\frac{5-6}{15}$; l. l. 50.

Depth of body equal to length of head, 3 times in total length. Snout as long as diameter of eye, which is 4 times in length of head; interorbital width 5 times in length of head; lower jaw slightly projecting, with feeble canine teeth on the sides; maxillary extending to below centre of eye, the width of its distal extremity $\frac{1}{2}$ diameter of eye; snout and vertex naked, cheeks and opercles scaly, the scales on the opercles large, larger than any on the body, in five vertical series; præopercle finely serrated, the serræ coarser at the angle, obsolete on the lower border; middle opercular spine strong, nearer lower than upper. Gill-rakers moderate, 12 on lower part of anterior arch. Dorsal originating above base of pectoral; the spines increasing in size to the fourth, which equals $\frac{2}{5}$ length of head and is a little shorter than the longest soft rays; no notch between the spinous and soft portions. Pectoral obtusely pointed, slightly longer than ventral, $\frac{3}{4}$ length of head. Second and third anal spines equal, stouter and slightly shorter than longest dorsal. Caudal slightly emarginate. Brown, with ill-defined darker vertical bars; soft dorsal, anal, and caudal with small dark and light spots; pectorals and ventrals yellowish.

Total length 150 millim.

Pacific coast of Mexico.

| | | |
|---|---|---|
| *a*. Ad. | Las Peñas, Jalisco. | Dr. A. C. Buller [C.]. |

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### 14. Serranus sanctæ-helenæ. (PLATE XI.)

Centropristis brasiliensis (*non Brisout*), *Günth.* i. p. 85 (1859).

D. X 12. A. III 7. Sc. 50–55 $\frac{4-5}{15-17}$; l. l. 47–52.

Depth of body $3\frac{1}{2}$ to 4 times in total length, length of head 3 to $3\frac{1}{4}$ times. Snout as long as or a little shorter than diameter of eye, which is $3\frac{1}{3}$ to $3\frac{1}{2}$ times in length of head; interorbital width 6 to 7 times in length of head; lower jaw projecting, with strong canine teeth on the sides; maxillary extending to below centre of eye, the width of its distal extremity $\frac{2}{5}$ diameter of eye; snout and vertex naked, cheeks and opercles scaly, the scales in 6 or 7 series on the cheek; præopercle finely serrated all round, the serræ somewhat coarser at the angle; middle opercular spine strong, nearly equally distant from upper and lower. Gill-rakers moderate, 14 or 15 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in size to the fourth, which equals nearly half length of head, and exceeds longest soft rays; a slight notch between spinous and soft portions. Pectoral obtusely pointed, a little longer than ventral, $\frac{3}{4}$ length of head. Second anal spine slightly shorter but stronger than third, as long as second dorsal. Caudal feebly emarginate. Yellowish olive, with five or six rather indistinct dark bars or vertical blotches; fins grey, dorsal yellowish at the base.

Total length 225 millim.

St. Helena.

| | | |
|---|---|---|
| *a–b.* Ad. | St. Helena. | J. C. Melliss, Esq. [P.]. |
| *c.* Ad., skin. | St. Helena. | General Hardwicke [P.]. |

### 15. Serranus atrobranchus *.

Centropristes atrobranchus, *Cuv. & Val.* iii. p. 45 (1829); *Günth.* i. p. 86 (1859).

Serranus atrobranchus, *Jord. Proc. U.S. Nat. Mus.* ix. 1886, p. 532; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 406.

D. X 12. A. III 7. Sc. 50 $\frac{4}{12}$; l. l. 49.

Depth of body equal to length of head, 3 times in total length. Snout shorter than diameter of eye, which is 3 times in length of head and double interorbital width; lower jaw slightly projecting, with very feebly enlarged teeth on the sides; maxillary extending to below centre of eye, the width of its distal extremity $\frac{1}{3}$ diameter of eye; snout and upper surface of head naked, cheeks and opercles with large scales; præopercle finely serrated, the serræ coarser at the angle, obsolete on the lower border; opercular spines rather feeble, median nearer lower than upper. Gill-rakers as long as gill-fringes, 12 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the fourth, which equals about half length of head and slightly exceeds longest

* Described from the type specimen (Paris Mus. no. 6980).



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soft rays; a shallow notch between spinous and soft portions. Pectoral rounded, as long as ventral, nearly as long as head. Second and third anal spines nearly equal in length, as long as tenth dorsal. Caudal crescentically emarginate. Yellowish, with six dark vertical bars, the second extending as a jet-black blotch on the spinous dorsal from the fourth to the ninth spine; a large inky-black blotch on inner side of opercular region, above the gills.

Total length 115 millim.

Coast of Brazil.

### 16. Serranus phœbe.

Serranus phœbe, *Poey, Mem. Cuba*, i. p. 55, pl. ii. fig. 3 (1851); *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 35; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 407.
Centropristis phœbe, *Günth.* i. p. 85 (1859).
Haliperca phœbe, *Poey, Repert. Cuba*, ii. 1868, p. 281.
Prionodes phœbe, *Jord. & Bollm. Proc. U.S. Nat. Mus.* xii. 1889, p. 159.

D. X 12. A. III 7. Sc. 50–54 $\frac{5-6}{16-17}$; l. l. 50–52.

Depth of body 3 to $3\frac{1}{4}$ times in total length, length of head 3 times. Snout shorter than diameter of eye, which is $2\frac{3}{4}$ to 3 times in length of head; interorbital width 6 to 7 times in length of head; lower jaw not projecting, with feeble canine teeth on the sides; maxillary extending to below anterior third or centre of eye, the width of its distal extremity $\frac{1}{3}$ to $\frac{1}{4}$ diameter of eye; snout and vertex naked, cheeks and opercles scaly; præopercle finely serrated all round, the serræ coarser at the angle; opercular spines strong, middle nearer lower than upper. Gill-rakers moderate, 13 or 14 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in size to the fourth, which equals half length of head, and slightly exceeds longest soft rays; no notch between spinous and soft portions Pectoral obtusely pointed, as long as ventral, $\frac{3}{4}$ to $\frac{4}{5}$ length of head. Second anal spine as long as and stronger than third, as long as or a little shorter than the second dorsal. Caudal crescentically emarginate. Pale reddish brown, belly and a vertical bar down the middle of the body white; membrane between dorsal spines tipped with blackish.

Total length 150 millim.

Coasts of Cuba and Southern Florida.

| | | |
|---|---|---|
| *a, b.* Ad. | S. America (?). | Sir R. Schomburgk [P.]. |
| *c, d.* Ad., skins. | W. Indies. | |

### 17. Serranus fusculus.

Centropristes fusculus, *Poey, Mem. Cuba*, ii. p. 342 (1860).
Haliperca fusculus, *Poey, Repert. Cuba*, ii. 1868, p. 281.
Serranus fusculus, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 407.

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D. X 12. A. III 7. Sc. 48.

Closely allied to *S. phœbe*, but scales on the head larger (in about five series on cheek) and extending forwards to middle of interorbital region. Teeth unusually strong. Gill-rakers rather short, 12 on lower part of anterior arch. Plain olive-brown, sides with about six faint dark cross-bars, more or less confluent along lateral line and disappearing below; fins all pale.

Cuba.

### 18. Serranus æquidens.

Serranus æquidens, *Gilb. Proc. U.S. Nat. Mus.* xiii. 1890, p. 61; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 401.

D. X 12. A. III 7. Sc. 48 $\frac{5}{13}$.

Depth of body $3\frac{1}{2}$ times in total length, length of head $2\frac{1}{3}$ times. Snout as long as diameter of eye, which is $4\frac{1}{2}$ times in length of head and greater than interorbital width; lower jaw little projecting; canine teeth scarcely differentiated; snout and interorbital region naked; cheeks and opercles with large scales; angle of præopercle slightly projecting, with minute and equal serræ; opercle with a single spine. Gill-rakers long, 17 on lower part of anterior arch. Dorsal spines weak, low, fourth longest, $3\frac{1}{2}$ times in length of head. Pectoral long and narrow, reaching front of anal. Anal spines slender, graduated. Caudal crescentically emarginate. Dusky brownish, paler below; a series of about seven ill-defined dusky blotches along lateral line; vertical fins transparent, with minute dark specks; ventrals with median rays black.

Total length 175 millim.

West coast of Mexico.

### 19. Serranus tabacarius.

Centropristes tabacarius, *Cuv. & Val.* iii. p. 44 (1829); *Guichen. in R. de la Sagra, Hist. Cuba, Poiss.* p. 28 (1853); *Günth.* i. p. 85 (1859).
Serranus jacome, *Poey, Mem. Cuba*, i. p. 57, pl. ii. fig. 1 (1852)
Haliperca tabacaria, *Poey, Repert. Cuba*, ii. 1868, p. 282.
Haliperca jacome, *Poey, Ann. Lyc. N. Y.* x. 1871, p. 34.
Serranus tabacarius, *Jord. Proc. U.S. Nat. Mus.* ix. 1886, p. 39; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 403.

D. X 12. A. III 7. Sc. 90–98 $\frac{9-11}{27-29}$; l. l. 56–65.

Depth of body $3\frac{1}{4}$ to $3\frac{1}{2}$ times in total length, length of head 3 times. Snout as long as diameter of eye, which is $3\frac{1}{2}$ to $3\frac{2}{3}$ times in length of head; interorbital width 5 times in length of head; lower jaw projecting, with feeble canine teeth on the sides; maxillary extending to below centre of eye, the width of its distal extremity $\frac{2}{5}$ to $\frac{1}{2}$ diameter of eye; upper surface of head naked, cheeks and opercles scaly; præopercle finely serrated, the serræ



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coarser at the angle, obsolete on the lower border; opercular spines strong, middle nearer lower than upper. Gill-rakers rather long, 15 or 16 on lower part of anterior arch. Dorsal originating above base of pectoral; the spines increasing in size to the fourth, which nearly equals half length of head, and exceeds longest soft rays; no notch between spinous and soft portions. Pectoral rounded, slightly longer than ventral, $\frac{2}{3}$ length of head. Third anal spine longest, as long as tenth dorsal. Caudal crescentically emarginate. Pale reddish brown above, with five or six yellowish-white blotches, the first on the occiput, the last on the caudal peduncle; a brown stripe on each lobe of the caudal, and a dark brown spot on the membrane between the three anterior dorsal spines.

Total length 150 millim.

Caribbean Sea.

| | | |
|---|---|---|
| *a*. Ad. | Barbados. | |
| *b*. Ad. | W. Indies. | Zoological Society [P.]. |
| *c–d*. Ad., skins. | W. Indies. | |

### 20. Serranus flavescens *.

Serranus flavescens, *Cuv. & Val.* vi. p. 506 (1830); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 408.

D. IX 12 †. A. III 7. Sc. 90 $\frac{7}{27}$; l. l. 60.

Depth of body $3\frac{3}{4}$ times in total length, length of head 3 times. Snout as long as diameter of eye, which is $3\frac{1}{2}$ times in length of head; interorbital width 5 times in length of head; lower jaw projecting, with feeble canine teeth on the sides; maxillary extending to below centre of eye, the width of its distal extremity $\frac{1}{2}$ diameter of eye; upper surface of head naked; cheeks and opercles scaly; præopercle finely serrated, the serræ coarser at the angle, obsolete on the lower border; opercular spines strong, equidistant. Gill-rakers a little shorter than gill-fringes, 14 on lower part of anterior arch. Dorsal originating above base of pectoral; spines subequal, not quite $\frac{1}{3}$ length of head, $\frac{3}{4}$ length of longest soft rays; no notch between spinous and soft portions. Pectoral rounded, a little longer than ventral, $\frac{2}{3}$ length of head. Third anal spine longest, as long as dorsals. Caudal emarginate. Brown above, lighter (orange or red) on the belly; head bluish above; fins dark grey-brown; caudal whitish in the middle.

Total length 160 millim.

Martinique.

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* Described from the type specimen (Paris Mus. no. 7028).

† The spinous dorsal is malformed in front; the normal number of spines is no doubt X.

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### 21. Serranus tigrinus.

*Seba, Thes.* iii. pl. xxvii. fig. 15 (1758).
Holocentrus tigrinus, *Bloch, Ausl. Fische*, iv. p. 77, pl. ccxxxvii. (1790).
Serranus tigrinus, *Cuv. & Val.* ii. p. 314 (1828); *Günth.* i. p. 114 (1859); *Jord. Proc. U.S. Nat. Mus.* ix. 1886, p. 579; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 408.
Serranus præstigiator, *Poey, Mem. Cuba*, i. p. 58, pl. ii. fig. 2 (1852).
Haliperca præstigiator, *Poey, Repert. Cuba*, ii. 1868, p. 282.

D. X 11–12. A. III 7. Sc. 68–70 $\frac{8}{24}$; l. l. 60.

Depth of body $3\frac{1}{2}$ to $3\frac{2}{3}$ times in total length, length of head $2\frac{5}{6}$ to 3 times. Snout as long as diameter of eye, which is 4 times in length of head; lower jaw projecting, with feeble canine teeth on the sides; maxillary extending to below centre of eye, the width of its distal extremity about $\frac{2}{5}$ diameter of eye; snout and top of head naked, cheeks and opercles scaly; præopercle rounded, with regular serræ; opercular spines strong. Gill-rakers very short, 8 to 10 on lower part of anterior arch. Dorsal originating above axilla; fourth dorsal spine about $\frac{1}{3}$ length of head; no notch between spinous and soft portions. Pectoral obtusely pointed, slightly longer than ventral, about $\frac{2}{3}$ length of head. Second and third anal spines of equal length, a little longer than longest dorsal spines. Caudal crescentically notched. Brownish above, yellowish on the sides; head, body, and fins with irregular black spots, blotches, and bars.

Total length 105 millim.

Caribbean Sea.

The following species is probably founded on a young *S. tigrinus*:—

#### Serranus annularis.

Centropristis annularis, *Günther, Chall. Shore Fish.* p. 6, pl. i. fig. B (1880).
Serranus annularis, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 406.

D. X 12. A. III 7. Sc. 67 $\frac{8}{23}$; l. l. 55.

Established on a young specimen, 50 millim. long, with broken caudal fin. It agrees in every important particular with *S. tigrinus*. Reddish, with two incomplete black rings behind the eye, a large black blotch on the upper half of the body below the spinous dorsal, and small black spots on the dorsal fin.

Coast of Brazil.

*a*. Yg. Off Pernambuco. H.M.S. 'Challenger.' (Type.)

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### 22. Serranus luciopercanus *.

Serranus luciopercanus, *Poey, Mem. Cuba*, i. p. 56, pl. ix. fig. 1 (1851); *Steind. Verh. zool.-bot. Ges. Wien*, xvi. 1866, p. 777, pl. xvi. fig. 1; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 410.

Centropristis luciopercanus, *Günth.* i. p. 84 (1859); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 137, pl. v. fig. 1 (1883).

Mentiperca luciopercana, *Poey, Repert. Cuba*, ii. 1868, p. 281.

Prionodes luciopercanus, *Jord. & Bollm. Proc. U.S. Nat. Mus.* xii. 1889, p. 158.

D. X 12. A. III 7. Sc. 85–90 $\frac{8\text{-}10}{25\text{-}29}$; l. l. 56–59.

Depth of body $3\frac{1}{4}$ to $3\frac{3}{4}$ times in total length, length of head 3 times. Snout longer than diameter of eye, which is $3\frac{1}{2}$ times in length of head; interorbital width 6 to 7 times in length of head; lower jaw strongly projecting, with feeble canine teeth on the sides; maxillary extending to below anterior third or centre of eye, the width of its distal extremity $\frac{2}{5}$ diameter of eye; snout and vertex naked, cheeks and opercles scaly; præopercle finely serrated, the serræ coarser at the angle and obsolete on the lower border; opercular spines strong. Gill-rakers longer than gill-fringes, 15 or 16 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in size to the fourth or fifth, which equals about $\frac{2}{5}$ to $\frac{1}{2}$ length of head, and exceeds longest soft rays; no well-marked notch between spinous and soft portions. Pectoral obtusely pointed, as long as ventral, $\frac{2}{3}$ length of head. Third anal spine longest, about as long as third dorsal. Caudal deeply emarginate, upper lobe the longer. Purplish, with reddish-brown irregular spots or marblings; fins yellow, spinous dorsal partly purple; upper and lower caudal lobes bordered with purple.

Total length 200 millim.

Caribbean Sea.

### 23. Serranus stilbostigma.

Prionodes stilbostigma, *Jord. & Bollm. Proc. U.S. Nat. Mus.* xii. 1889, p. 158.

Serranus stilbostigma, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 409.

D. X 12. A. III 7. Sc. 58 $\frac{8}{18}$.

Near *S. luciopercanus*. Depth of body $3\frac{2}{3}$ times in total length, length of head 3 times. Snout sharp, a little longer than diameter of eye, which is 4 times in length of head; lower jaw considerably projecting; teeth small; maxillary reaching nearly to below centre of eye. Dorsal not notched; fourth spine $\frac{2}{5}$ length of head. Second anal spine strongest, hardly as long as third. Pectoral pointed, a

* I have examined three specimens, from Martinique, in the Paris Museum.

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little longer than ventral. Caudal deeply emarginate, upper lobe the longer. Red, with numerous inky-black spots on posterior half of body, most of them round, rather smaller than pupil, and arranged in irregular horizontal rows; a large quadrate blotch in front of soft dorsal, extending on the fin; dorsal with dark spots; lower half of caudal chiefly black; a large, oblong, silver-white blotch from before vent, extending obliquely upward and backward to near the black dorsal blotch.

Total length 185 millim.

Pacific coast of Equatorial America.

### 24. Serranus psittacinus.

Prionodes fasciatus, *Jenyns, Zool. Beagle, Fish.* p. 47, pl. ix. fig. 1 (1842); *Günth.* i. p. 96 (1859).

Serranus psittacinus, *Val. Voy. Venus, Poiss.* p. 299, pl. i. fig. 1 * (1855); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 407.

Centropristis psittacinus, *Günth. t. c.* p. 86.

Serranus calopteryx, *Jord. & Gilb. Proc. U.S. Nat. Mus.* iv. 1881, p. 350; *Jord. Proc. U.S. Nat. Mus.* v. 1882, p. 361.

D. X 12. A. III 7. Sc. 50 $\frac{5}{16}$; l. l. 49.

Depth of body $3\frac{1}{3}$ to 4 times in total length, length of head $2\frac{5}{6}$ to $3\frac{1}{2}$ times. Snout longer than diameter of eye, which is 4 to 5 times in length of head; lower jaw strongly projecting, with strong canine teeth; maxillary extending to below posterior third of eye, the width of its distal extremity about half diameter of eye; snout and vertex naked, cheeks and opercles scaly; præopercle finely serrated, the serræ coarser at the angle and obsolete on the lower border; opercular spines strong. Gill-rakers short, about 10 on lower part of anterior arch. Dorsal originating above base of pectoral; the spines increasing in size to the fourth, which is about $\frac{1}{3}$ length of head, then subequal and considerably shorter than the soft rays; no notch between spinous and soft portions. Pectoral obtusely pointed, longer than ventral, $\frac{3}{4}$ length of head. Second and third anal spines subequal, as long as longest dorsals. Caudal feebly emarginate. Olivaceous, with red markings or dark brown cross-bands; soft dorsal with small round red spots.

Total length 200 millim.

Pacific coast of America, from Lower California to the Galapagos Islands.

### 25. Serranus radians.

? Perca formosa, part., *Linn. S. N.* i. p. 488 (1766).

Serranus radians, *Quoy & Gaim. Voy. Uranie, Zool.* p. 313, pl. lviii. fig. 2 (1824).

Serranus irradians, *Cuv. & Val.* ii. p. 244 (1828).

Serranus fascicularis, *Cuv. & Val. t. c.* p. 245, pl. xxx., and ix. p. 431 (1833); *Jord. & Gilb. Syn. Fish. N. Am.* p. 534 (1882).

* Type (Paris Mus. no. 7546) examined.

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Diplectrum fasciculare, *Holbr. Ichth. S. Carol.* p. 32, pl. v. fig. 1 (1853).
Centropristis radians, *Günth.* i. p. 83 (1859).
Centropristis fascicularis, *Günth. l. c.*
Diplectrum radians, *Poey, An. Soc. Espan.* iv. 1875, p. 97.
Serranus formosus, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, pp. 35, 125.
Diplectrum formosum, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 397, pl. lxv.

D. X 12. A. III 7. Sc. 80–90 $\frac{7-9}{22-23}$; l. l. 54–60.

Depth of body $3\frac{2}{5}$ to 4 times in total length, length of head 3 to $3\frac{1}{4}$ times. Snout longer than diameter of eye, which is $4\frac{1}{2}$ to 5 times in length of head, and but slightly exceeds interorbital width; lower jaw projecting; canine teeth feeble; maxillary extending to below centre or posterior third of eye, the width of its distal extremity $\frac{2}{5}$ to $\frac{1}{2}$ diameter of eye; snout and top of head naked, cheeks and opercles scaly; præopercle with two groups of strong divergent spines, the lower at the angle; opercular spines strong. Gill-rakers rather long, 14 or 15 on lower part of anterior arch. Dorsal originating above base of pectoral; spines rather feeble, increasing in size to the fourth or fifth, which measures about $\frac{1}{3}$ length of head; no notch between spinous and soft portions. Pectoral asymmetrical, rounded, upper rays longest, as long as or a little longer than ventrals, about $\frac{3}{4}$ length of head. Anal spines feeble, third longest. Caudal crescentically notched, with the lobes more or less produced in the adult. Brownish, with ill-defined darker vertical bars; sides of head and body with blue lines; dorsal and caudal fins barred blue and yellow. Young with a blackish lateral streak passing through the eye.

Total length 270 millim.

Atlantic coast of America, from South Carolina to Montevideo.

| | | |
|---|---|---|
| *a*. Ad. | Off Charleston, S. Carolina. | Smithsonian Institution. |
| *b*. Ad. | Pensacola, Florida. | |
| *c*. Yg. | Key West, Florida. | |
| *d*. Hgr. | Santos, Brazil. | Museum Godeffroy. |

### 26. Serranus conceptionis.

Serranus conceptionis, *Cuv. & Val.* ii. p. 246 (1828); *Less. Voy. Coquille, Zool.* ii. p. 236 (1830).
? Plectropoma paytensis, *Less. l. c.* p. 233; *Günth.* i. p. 165 (1859).
Centropristis conceptionis, *Günth. t. c.* p. 84.
Diplectrum conceptione, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 399.
? Hemilutjanus paytensis, *Jord. & Eigenm. l. c.* p. 345.

D. X 12. A. III 6–7. Sc. 65–70 $\frac{5-7}{17-20}$; l. l. 53–55.

Depth of body 4 times in total length, length of head 3 to $3\frac{1}{4}$ times. Snout as long as diameter of eye, which is $3\frac{1}{4}$ to $3\frac{1}{2}$ times in length of head and about twice interorbital width; lower jaw slightly projecting; canine teeth feeble; maxillary extending to

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below centre or posterior third of eye, the width of its distal extremity about ⅓ diameter of eye; snout and top of head naked, cheeks and opercles scaly; præopercle produced at the angle, where the serræ are enlarged, lower border smooth; a rather strong opercular spine. Gill-rakers moderate, 13 to 15 on lower part of anterior arch. Dorsal originating above base of pectoral; spines rather feeble, increasing in size to the fifth, which measures ⅔ length of head; no notch between spinous and soft portions. Pectoral ¾ length of head, slightly longer than ventrals. Anal spines feeble, third longest. Caudal crescentically notched. Uniform brownish above (in spirit), silvery beneath.

Total length 120 millim.

Coasts of Chili and Peru.

*a*, *b*. Hgr. —— ? Haslar Collection.

### 27. Serranus radialis.

Serranus radialis, *Quoy & Gaim. Voy. Uranie, Zool.* p. 316 (1824); *Cuv. & Val.* ii. p. 243 (1828).
Serranus bivittatus, *Cuv. & Val. t. c.* p. 241.
Centropristis bivittatus, *Günth.* i. p. 82 (1859).
Centropristis radialis, *Günth. t. c.* p. 83, *and Zool. Rec.* 1868, p. 142; *Steind. Sitzb. Ak. Wien*, lxxii. i. 1876, p. 556.
Centropristis macropoma, *Günth. Proc. Zool. Soc.* 1864, p. 145, *and Tr. Zool. Soc.* vi. 1868, p. 409, pl. lxv. fig. 1.
Haliperca bivittata, *Poey, Repert. Cuba*, ii. 1868, p. 282.
Centropristes ayresii, *Steind. Sitzb. Ak. Wien*, lvii. i. 1868, p. 965, pl. i. fig. 1.
Paraserranus hasseltii, *Bleek. Verh. Akad. Amst.* xiv. no. 2, 1873, p. 7, *and Atlas Ichth.* vii. p. 22, pl. cccxxxi. fig. 1 (1876).
Diplectrum radialis, *Streets, Bull. U.S. Nat. Mus.* no. 7, 1877, p. 52; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 398.
Diplectrum euryplectrum, *Jord. & Bollm. Proc. U.S. Nat. Mus.* xii. 1889, p. 157; *Jord. & Eigenm. l. c.* p. 398.
Diplectrum macropoma, *Jord. & Bollm. l. c.* p. 158; *Jord. & Eigenm. l. c.*

D. X 12. A. III 7–8. Sc. 60–70 $\frac{6-8}{18-21}$; l. l. 48–55.

Depth of body 3½ to 4 times in total length, length of head 3 to 3¼ times. Snout as long as diameter of eye, which is about ¼ length of head and twice interorbital width; lower jaw slightly projecting; canine teeth feeble; maxillary extending to below posterior third or posterior border of eye, the width of its distal extremity ⅓ to ⅔ diameter of eye; snout and top of head naked, cheeks and opercles scaly; præopercle produced at the angle, which is armed with diverging spines; a strong opercular spine. Gill-rakers rather long, 13 or 14 on lower part of anterior arch. Dorsal originating above base of pectoral; spines rather feeble, increasing in size to the fourth or fifth, which measures about ⅔ length of head; a distinct but shallow notch between spinous and soft portions. Pectoral asymmetrical, rounded, upper rays longest, a little longer than ventral, about ⅔ length of head. Anal spines feeble, third

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longest. Caudal crescentically notched. Yellowish brown above, with dark brown spots and faint vertical bars, with or without a darker lateral stripe below the lateral line; silvery below; dorsal and caudal fins spotted or clouded with brown.

Total length 180 millim.

Atlantic and Pacific coasts of Tropical America.

| | | |
|---|---|---|
| *a*. Ad. | Pernambuco. | Capt. Milner [P.]. |
| *b*. Ad. | Bahia. | Dr. Wucherer [C.]. |
| *c*. Ad. | Bahia. | |
| *d–f*. Hgr. | Pacific coast of Panama. | Capt. Dow & O. Salvin, Esq. [C.]. (Types of *C. macropoma*.) |

### 28. Serranus sciurus.

Diplectrum sciurus, *Gilbert, Proc. U.S. Nat. Mus.* xiv. 1891, p. 550.

D. X 12. A. III 8. Sc. 75; l. l. 52.

Most closely resembling the preceding, but differing in the very numerous and long gill-rakers, about 25 in number, on lower part of anterior arch. Depth of body $3\frac{4}{5}$ times in total length, length of head $2\frac{4}{5}$ to 3 times. A single rather wide cluster of spines at angle of præopercle; scales on cheeks small. Dorsal low. Upper part of body crossed with irregular dusky bars; a light blue line below orbit; soft dorsal and caudal with round yellow spots ocellated with blue or dusky.

Total length 130 millim.

Gulf of California.

III. Hypoplectrus, Gill.—Smooth area of cranium extending posteriorly to a line connecting the præopercular borders, the supraoccipital and parietal bones being short. Lower border of præopercle rather strongly serrated.

### 29. Serranus lamprurus.

Serranus lamprurus, *Jord. & Gilb. Bull. U.S. Fish Comm.* i. 1882, p. 322.

Hypoplectrus lamprurus, *Jord. Proc. U.S. Nat. Mus.* viii. 1885, p. 376; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 384.

D. X 13. A. III 8. Sc. circa $60\frac{6}{-}$; l. l. 46.

Depth of body $2\frac{1}{4}$ times in total length, length of head $2\frac{3}{5}$ times. Snout about as long as eye, which is $3\frac{1}{2}$ times in length of head and exceeds interorbital width; jaws subequal, lower slightly included; maxillary extending to below centre of eye; snout and top of head naked; cheeks and opercles scaly; opercle with two flat spines. Dorsal spines strong, fourth longest, about equal to soft rays and nearly half length of head; last spine considerably shorter than soft rays. Pectoral a little shorter than head, a little shorter than ventral. Anal spines strong, second longer and stronger than third. Caudal feebly emarginate. Colour black,

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with violet lustre; faint pale streaks formed by paler spots along rows of scales on lower part of body; entire caudal fin abruptly translucent; pectoral nearly colourless; tips of spines of dorsal and anal, and terminal portions of soft rays, abruptly whitish; ventrals black.

Total length 75 millim.

Panama Bay.

### 30. Serranus unicolor.

*Seba, Thes.* iii. pl. xxvii. fig. 10 (1758).
Holocentrus unicolor, *Bl. Schn. Syst.* i. p. 322 (1801).
Plectropoma puella, *Cuv. & Val.* ii. p. 405, pl. xxxvii. (1828); *Poey, Mem. Cuba*, i. p. 62, pl. ix. fig. 2 (1851); *Guichen. in R. de la Sagra, Hist. Cuba, Poiss.* p. 18 (1853); *Günth.* i. p. 165 (1859).
Plectropoma chlorurum, *Cuv. & Val. t. c.* p. 406; *Günth. t. c.* p. 167; *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 104, pl. v. fig. 2 (1877).
Plectropoma ephippium, *Cuv. & Val. t. c.* p. 408.
Plectropoma vitulinum, *Poey, l. c.* p. 68.
Plectropoma indigo, *Poey, l. c.* p. 69, pl. iii. fig. 1; *Günth. t. c.* p. 166.
Plectropoma bovinum, *Poey, l. c.*; *Günth. l. c.*
Plectropoma gummigutta, *Poey, l. c.* p. 70, pl. iii. fig. 2; *Günth. l. c.*
Plectropoma guttavarium, *Poey, l. c.*; *Günth. l. c.*
Plectropoma nigricans, *Poey, l. c.* p. 71.
Plectropoma accensum, *Poey, l. c.* p. 72.
Plectropoma melanorhina, *Guichen. op. cit.* p. 18, pl. i. fig. 1.
Plectropoma unicolor, *Günth. t. c.* p. 167.
Plectropoma affine, *Poey, Mem. Cuba*, ii. p. 427 (1860).
Hypoplectrus puella, *Poey, Repert. Cuba*, ii. 1868, p. 290; *Goode, Bull. U.S. Nat. Mus.* no. 5, 1876, p. 60; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 384.
Hypoplectrus nigricans, *Poey, l. c.*; *Jord. & Gilb. Syn. Fish. N. Am.* p. 918 (1882).
Hypoplectrus accensus, *Poey, l. c.*
Hypoplectrus chlorurus, *Poey, l. c.*
Hypoplectrus indigo, *Poey, l. c.*
Hypoplectrus bovinus, *Poey, l. c.*
Hypoplectrus gummigutta, *Poey, l. c.*
Hypoplectrus guttavarius, *Poey, l. c.* p. 291.
Hypoplectrus pinnavaria, *Poey, l. c.*
Hypoplectrus aberrans, *Poey, l. c.*
Hypoplectrus maculiferus, *Poey, Ann. Lyc. N. Y.* x. 1871, p. 78, pl. i. fig. 2.
? Plectropoma crocota, *Cope, Tr. Am. Philos. Soc.* (2) xiv. 1871, p. 466.
Hypoplectrus affinis, *Poey, An. Soc. Espan.* iv. 1875, p. 98.
Serranus chlorurus, *Jord. & Gilb. l. c.* p. 537.
? Hypoplectrus crocotus, *Jord. & Eigenm. l. c.* p. 386.

D. X 14–15. A. III 7. Sc. 80–92 $\frac{8-10}{30-35}$; l. l. 52–60.

Depth of body 2 to $2\frac{1}{3}$ times in total length, length of head $2\frac{2}{3}$ to 3 times. Snout longer than diameter of eye, which is $3\frac{1}{2}$ to 4 times in length of head and nearly equals interorbital width; lower jaw slightly projecting, with small canines; maxillary extending to below anterior third or centre of eye, the width of its distal extremity $\frac{2}{3}$ to $\frac{2}{3}$ diameter of eye; snout and top of head smooth, cheeks and opercles scaly; opercular spines moderate. Gill-rakers rather

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short, 12 or 13 on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the third or fourth, then subequal, $\frac{2}{3}$ to $\frac{1}{2}$ length of head, and a little shorter than soft rays. Pectoral obtusely pointed, upper rays longest, nearly as long as the head, as long as or a little longer than ventral. First anal spine short, third longest, about as long as longest dorsals. Caudal feebly emarginate. Coloration very variable.

Total length 145 millim.

Gulf of Mexico and Caribbean Sea to the Bermudas.

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Jordan and Eigenmann, after examining typical examples of a large number of the species of *Hypoplectrus* described by Poey, arrive at the conclusion that all these forms, however strikingly differing in colour, constitute but a single species, as even among those in which the coloration seems most sharply defined there are many variations. The following synopsis of the principal colour-variations is taken from these authorities:—

I. Soft dorsal checkered or spotted with pale blue or crossed by blue lines (these occasionally obsolete).

A. Body all violet, with 5 or 6 more or less distinct black cross-bars, the middle one broadest and meeting its fellow under the belly; the band on the nape broad and saddle-like, bounded by two pale cross-streaks on nape, opercle, and cheek; snout pale, a pale shade across it; ventrals pale or dark; other fins, except spinous dorsal, mostly pale.

Cheek with a blue band before eye and some blue spots before it ..... *S. puella.*

Cheek without blue band; no blue spots on snout; colours duller ..... *S. vitulinus.*

B. Body and head yellow anteriorly; body abruptly black posteriorly, the black extending forward to a wavy line reaching from first dorsal spine to vent; a broad dark blue band in front of eye, bordered by sky-blue; fins chiefly orange; ventral and anal bordered by sky-blue ..... *S. pinnavarius.*

C. Body dusky, head and belly orange, top of head olivaceous; a black spot on each side of caudal peduncle close behind dorsal; black band or spot in front of eye not bordered with blue; cheeks, opercles, and breast with vertical lines of metallic blue; dorsal yellowish; pectoral and caudal orange; a black spot in the axil; upper margin of pectoral blue; anal orange, with blue border; ventral greenish, its base orange ..... *S. maculiferus**.

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* This is apparently the same as the typical form, the inappropriate name of which (*unicolor*) was changed by Cuvier and Valenciennes to *ephippium*.

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II. Soft dorsal plain, without distinct blue lines or spots.

A. Præorbital region with one or more dark blue stripes, bordered with bright sky-blue.

Body yellow anteriorly, black posteriorly, the black extending forward to a line joining the nape and last anal ray; fins orange; a single blue-black stripe or spot in front of eye, ocellated with sky-blue; caudal peduncle very dark above ..... *S. guttovarius.*

Body all orange-yellow; fins orange; snout and lower jaw blue; two blue stripes before the eye..... *S. gummigutta.*

B. Præorbital region without blue stripes.

1. Præorbital region with violet spots; a round black spot on side of caudal peduncle; dorsal light greenish; body light olive-green above, reddish below; pectorals pale yellow, the first ray blue; ventrals, anal, and caudal light orange ..... *S. aberrans.*

2. Præorbital region without distinct violet spots.

*a.* General colour blackish, brown, or yellowish.

Brownish, middle of front of body yellowish; fins all yellow except the ventrals, which are black ..... *S. accensus.*

Yellowish pink; caudal and pectorals pale; ventrals and anal bright light blue ..... *S. affinis.*

Black, with violet shades; pectoral and caudal fins abruptly bright yellow ..... *S. chlorurus.*

Black, with violet shades; fins not lighter ..... *S. nigricans.*

*b.* General colour deep indigo-blue everywhere on body and fins; body with four to six broad cross-bars of darker blue.

Cheeks plain ..... *S. indigo.*

Cheeks with a dark blue suborbital band, between two bands of clear blue ..... *S. bovinus.*

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| | | |
|---|---|---|
| *a.* Hgr. | Bermuda. | J. M. Jones, Esq. [P.]. |
| *b.* Hgr., skin. | Jamaica. | Parnell Collection. |
| *c.* Ad. | St. Croix. | |
| *d.* Ad. | Barbados. | |
| *e.* Ad. | Dominica. | |
| *f.* Ad., skin. | W. Indies. | |
| *g–h.* Ad. | Puerto Cabello. | |
| *i, k.* Ad. | S. America. | Sir R. Schomburgk [P.]. |
| *l–m, n.* Ad. | —— ? | |

## 31. Serranus gemma.

Hypoplectrus gemma, *Goode & Bean, Proc. U.S. Nat. Mus.* v. 1882, p. 428; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 386.

D. X 15. A. III 7. Sc. 76 $\frac{9}{}$.

Agrees in general appearance and scaling with *H. unicolor*, but caudal crescent-shaped, the external rays being much prolonged, especially those of the upper lobe, which are twice as long as the middle ones. Colour in spirit dull purple, in life probably deep

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purple, with cloudings of lighter; fins colourless, the external rays of the caudal corresponding in hue with the darker parts of the body.

Florida Keys.

## 28. CENTROPRISTES.

Centropristes, part., *Cuv. & Val.* iii. p. 36 (1829); *Günth. Cat.* i. p. 82 (1859).
Anthias, part., *Günth. t. c.* p. 88.
Serranus, part., *Jord. & Gilb. Syn. Fish. N. Am.* p. 532 (1882).
Triloburus (*Gill*), *Jord. & Gilb. l. c.* p. 534.
Centropristis, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 390.

Body compressed; scales moderate, denticulated. Lateral line complete. Mouth rather large, protractile; maxillary exposed; villiform teeth in jaws, intermixed with slightly enlarged canines; teeth on vomer and palatines; tongue smooth; head partly scaled; præopercle serrated, the lower border with small antrorse serræ; opercle with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers rather long, slender. Dorsal fins confluent, with X 11 rays, the spinous and soft portions subequal in length; anal short, with III 7 rays. Caudal with some of the rays more or less produced. Pectorals with the upper half truncate posteriorly, with 19 rays. Ventrals anterior to base of pectorals, close together, with a strong spine. Posterior processes of the præmaxillaries not extending to the frontals; frontals posteriorly with an angular transverse ridge in front of the supraoccipital, connecting the parietal crests; supraoccipital and parietals with strong crests, extending forwards to between the postfrontal processes. Vertebræ 24 (10+14).

Atlantic coast of North America.

*Synopsis of the Species.*

| | |
|---|---|
| Caudal fin with its angles little produced ..... | 1. *atrarius*, p. 302. |
| Caudal trifurcate; longest dorsal spine not half length of head ..... | 2. *ocyurus*, p. 303. |
| Caudal trifurcate; longest dorsal spine half length of head, tipped with a long fleshy filament.... | 3. *trifurca*, p. 304. |

### 1. Centropristes atrarius.

? Labrus striatus, *Linn. S. N.* (ed. 10) i. p. 285 (1758).
Perca atraria, *Linn. S. N.* i. p. 485 (1766); *Gronow, Cat.* p. 111 (1854).
Perca furva, *Walb. Art. Gen. Pisc.* iii. p. 336 (1792).
Coryphæna nigrescens, *Bl. Schn. Syst.* p. 297 (1801).
Lutjanus trilobus, *Lacép. Poiss.* iv. p. 246 (1802).
Perca varia, *Mitchill, Tr. Lit. Phil. Soc. N. Y.* i. 1815, p. 415, pl. iii. fig. 6.
Centropristes nigricans, *Cuv. & Val.* iii. p. 37, pl. xliv. (1829); *Storer,*

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*Rep. Fish. Rept. Mass.* p. 9 (1839); *De Kay, N. Y. Faun., Fish.* p. 24, pl. ii. fig. 6 (1842).
Centropristes rufus, *Cuv. & Val. t. c.* p. 47.
Centropristes varius, *Storer, Mem. Amer. Acad.* (2) v. 1853, p. 58, pl. ii. fig. 4; *Putnam, Proc. Essex Inst.* i. 1856, p. 144.
Centropristis atrarius, *Günth.* i. p. 86 (1859); *Holbr. Ichth. S. Carol.* p. 45, pl. vii. fig. 2 (1860); *Goode & Bean, Proc. U.S. Nat. Mus.* ii. 1879, p. 145.
Serranus atrarius, *Jord. & Gilb. Syn. Fish. N. Am.* p. 533 (1882); *Goode, Fish. & Fisher. Industr. U. S.* i. pl. clxii. (1884), *and N. Am. Fish.* p. 39, fig. (1888).
Serranus nigrescens, *Jord. & Gilb. l. c.* p. 917.
Serranus furvus, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 546.
Serranus rufus, *Jord. Proc. U.S. Nat. Mus.* ix. 1886, p. 533.
Centropristis striatus, *Jord. & Eigenm. Bull. U.S. Nat. Mus.* viii. 1890, p. 391.

D. X 11. A. III 7. Sc. 55–60 $\frac{5-6}{16-20}$; l. l. 50–55.

Depth of body $2\frac{2}{3}$ to 3 times in total length, length of head 3 times. Snout longer than diameter of eye, which is about 5 times in length of head, and nearly equals interorbital width; lower jaw slightly projecting; maxillary extending to below centre of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye; snout and interorbital region naked; cheeks and opercles scaly; præopercle rounded, finely serrated, the serræ of the lower border directed forwards; opercular spine feeble. Gill-rakers about 18 on lower part of anterior arch. Dorsal originating above base of pectoral; first and second spines short, third or fourth longest, usually not quite half length of head, and considerably shorter than longest soft rays; the dorsal spines with short dermal flaps. Pectoral $\frac{3}{4}$ length of head, as long as or a little longer than the ventral. Anal spines graduated, third about as long as last dorsals. Caudal with convex posterior border and with the upper, or upper and lower rays somewhat produced. Grey, with black edges to the scales, or black with paler longitudinal streaks; young with a black lateral stripe; dorsal fin with oblique black and grey stripes.

Total length 330 millim.

Atlantic coast of the United States, from Cape Cod to Northern Florida.

| | | |
|---|---|---|
| *a–b.* Ad. & yg. | Wood's Holl, Massachusetts. | Smithsonian Instit. |
| *c.* Ad., skin. | New York. | Parnell Collection. |
| *d.* Ad., skin. | Carolina. | Gronow Collection. |
| *e.* Ad. | N. America. | |

## 2. Centropristes ocyurus.

Serranus trifurcus, *Jord. & Gilb. Proc. U.S. Nat. Mus.* v. 1882, p. 273.
Serranus ocyurus, *Jord. & Everm. Proc. U.S. Nat. Mus.* ix. 1886, p. 468.
Centropristis ocyurus, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 392.

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Very closely allied to, and perhaps merely a deep-water variety of, the preceding. Caudal fin with its upper and lower lobes filamentous, much produced, the middle rays still longer, nearly half length of body in adult. Scales on cheeks in only seven rows. Greyish, each side with three longitudinal rows of quadrate black blotches, the upper series obscure; some jet-black spots about opercle and above axil; dorsal with a series of jet-black spots along its base; caudal with the middle rays black at their tips, the outer pale, and jet-black spots on middle rays.

Gulf of Mexico, in deep water.

### 3. Centropristes trifurca.

? Perca philadelphica*, *Linn. S. N.* i. p. 484 (1766).
Perca trifurca, *Linn. l. c.* p. 489.
Lutjanus tridens, *Lacép. Poiss.* iv. p. 246 (1802).
Centropristis tridens, *Cuv. & Val.* iii. p. 43 (1829).
Centropristis trifurca, *De Kay, N. Y. Faun., Fish.* p. 25 (1842); *Holbr. Ichth. S. Carol.* p. 49, pl. vii. fig. 1 (1860).
Anthias trifurcus, *Günth.* i. p. 91 (1859).
Serranus trifurcus, *Jord. & Gilb. Syn. Fish. N. Am.* p. 534 (1882).
Serranus philadelphicus, *Jord. & Gilb. Proc. U.S. Nat. Mus.* v. 1882, p. 600.
Centropristis philadelphicus, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 393.

D. X 11. A. III 7. Sc. 55 $\frac{6}{20}$; l. l. 52.

Depth of body 3½ to 4 times in total length, length of head 2⅔ to 3 times. Snout as long as diameter of eye, which is about 4 times in length of head; lower jaw projecting; maxillary extending to beyond vertical of centre of eye; snout and top of head naked; cheeks and opercles scaly; præopercle finely serrate, the serræ on the angle scarcely enlarged. Third or fourth dorsal spine longest, half length of head; some of the dorsal spines tipped with long fleshy filaments. Pectoral ⅔ length of head. Caudal fin trifurcate, the lobes more or less produced. Olive-grey; sides with about seven brown vertical bars; a large black spot on membrane of last dorsal spines; dorsal filaments scarlet; fins with round brownish spots.

Total length 300 millim.

Atlantic coast of Southern United States.

## 29. CHELIDOPERCA.

Centropristis, part., *Günth. Cat.* i. p. 82 (1859).

Body compressed; scales rather large, rough and ciliated. Lateral line complete, the tube with ascending tubule. Mouth large, protractile; maxillary exposed; jaws with bands of villiform teeth, a few of the inner ones in the middle of the upper

* This fish does not occur so far north as Philadelphia.

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jaw enlarged, depressible, hinged at the base; teeth on vomer and palatines; tongue smooth; head partly scaled; præopercle serrated, without antrorse teeth on the lower border; opercle with two spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers rather long. Dorsal fins confluent, with X 10 rays, the spinous and soft portions subequal in length. Anal short, with III 6 rays. Pectorals subsymmetrical, obtusely pointed, with 17 rays. Ventrals anterior to base of pectorals, close together, with a strong spine. Posterior processes of præmaxillaries not extending to the frontals; supraoccipital and parietal crests short, smooth area of cranium extending posteriorly to a line connecting the præopercular borders.

West Pacific and Indian Oceans.

### 1. Chelidoperca hirundinacea.

Centropristis hirundinaceus, *Cuv. & Val.* vii. p. 450 * (1831); *Temm. & Schleg. Faun. Japon., Pisc.* p. 14, pl. v. fig. 1 (1844); *Günth.* i. p. 87 (1859); *Bleek. Acta Soc. Sc. Ind. Neerl.* viii. 1860, *Vischf. Jap.* p. 75; *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 233.
Centropristis pleurospilus, *Günth. Voy. Challenger, Shore-Fish.* p. 37, pl. xvi. fig. D (1880).

D. X 10. A. III 6. Sc. 45–50 $\frac{4}{12-14}$; l. l. 43–44.

Depth of body 4 to 4¼ times in total length, length of head 2⅔ to 3 times. Snout as long as or a little shorter than diameter of eye, which is 3⅓ to 3⅔ times in length of head; interorbital region very narrow, ⅓ to ⅔ diameter of eye; lower jaw projecting; maxillary extending to below centre of eye; snout, interorbital region, and jaws naked, cheeks and opercles with large scales; præopercle rounded, its posterior border evenly serrated; two strong opercular spines. 13 gill-rakers on lower part of anterior arch. Dorsal originating above base of pectoral; spines rather feeble, not very unequal, fourth or fifth longest, ⅖ length of head. Pectoral ⅔ to ¾ length of head. Anal spines feeble, third longest. Caudal with the margin excised, upper rays more or less produced. Rosy, with a yellow lateral stripe; a series of four or five oblong black spots along the side of the body, disappearing in the adult; dorsal fin with some brown spots.

Total length 130 millim. The specimen in the Paris Museum measures 175.

Tropical West Pacific Ocean (Japan and Kei Islands).

| | | |
|---|---|---|
| *a*. Hgr. | Off Kei Ids., Arafura Sea, 129 faths. | H.M.S. 'Challenger.' (Type of *C. pleurospilus*.) |

### 2. Chelidoperca investigatoris.

Centropristis investigatoris, *Alcock, Ann. & Mag. N. H.* (6) vi. 1890, p. 199, *and Illustr. Zool. Investig., Fish.* ii. pl. x. fig. 1 (1894).

* Type (Paris Mus. no. 6983) examined.



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D. X 10. A. III 6. Sc. 50 $\frac{2\frac{1}{2}}{12}$; l. l. 42.

Depth of body $3\frac{1}{2}$ to $3\frac{2}{3}$ times in total length, length of head $2\frac{1}{2}$ times. Snout shorter than diameter of eye, which is about 4 times in length of head; interorbital region very narrow; lower jaw projecting; maxillary extending to below posterior fourth of eye; præopercular border rounded and serrated throughout; opercle with two flat spines. Fourth and fifth dorsal spines longest. Pectoral $\frac{3}{5}$ length of head. Caudal emarginate. Pink above, white below, with a bright yellow lateral stripe from the tip of the snout through the eye to the caudal fin; indefinite bright yellow markings on the cheeks, opercles, and fins; in spirit, faded yellow, with four incomplete cross-bands of grey.

Total length 140 millim.

Off Madras coast.

## 30. GILBERTIA.

Plectropoma, part., *Cuv. & Val.* ii. p. 387 (1828); *Günth. Cat.* i. p. 158 (1859); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 94 (1877).
Hypoplectrodes, *Gill, Proc. Ac. Philad.* 1862, p. 236 (no definition).
Gilbertia, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 346.

Body compressed; scales moderate, rough on the border, denticulated. Lateral line complete, the tube very short or branched. Mouth large, protractile; maxillary exposed, without or with a slight rudiment of supplemental bone; jaws with villiform teeth, the inner of which are depressible, hinged; rather small canines in front of the jaws and one or two on each side of the mandible; narrow bands of teeth on vomer and palatines; tongue smooth. Head scaly; maxillary and mandible naked; præopercle denticulate, with a few antrorse spines below; opercle with two strong spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present. Gill-rakers moderate or rather short. A single dorsal fin, scaly at the base, with X 16–21 rays, the spinous and soft portions subequal in length. Anal short, with III 7–8 rays. Caudal truncate or rounded. Pectorals symmetrical, obtusely pointed, with 14–16 rays, the middle and lower of which are dilated and much branched distally. Ventrals below pectorals, close together, with a strong spine. Posterior processes of præmaxillaries short, not extending to the frontals; cranium smooth and convex behind the orbits; supraoccipital and parietals very short, with moderately strong crests. Vertebræ 27 (10+17).

South Pacific Ocean.

### *Synopsis of the Species.*

I. Second anal spine longer than third, nearly as long as longest dorsal; lateral line feebly marked, the tubules mostly confined to the basal part of the scale.

Tenth dorsal spine nearly as long as second; dorsal with 19 to 21 soft rays; sc. 50-55 $\frac{3-4}{23-24}$ ..... 1. *semicincta*, p. 307.

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Tenth dorsal spine nearly as long as first; dorsal with 17 or 18 soft rays; sc. 53–55 $\frac{6-7}{22-23}$ ..... 2. *annulata*, p. 308.

II. Second and third anal spines nearly equal, shorter than longest dorsal; lateral line well-marked, the tubules extending to the end of the scale; dorsal with 16 to 18 soft rays; sc. 60–65 $\frac{3-4}{26}$. 3. *nigrorubra*, p. 308.

III. Third anal spine a little longer than second; dorsal with 20 soft rays; sc. 70 ..... 4. *armata*, p. 309.

## 1. Gilbertia semicincta.

Plectropoma semicinctum, *Cuv. & Val.* ix. p. 442 (1833); *Guichen. in Gay, Hist. Chile, Zool.* ii. p. 153, *Ichth.* pl. ii. fig. 1 * (1854); *Günth.* i. p. 160 (1859); *Steind. Sitzb. Ak. Wien*, liii. i. 1866, p. 425, & lxxi. i. 1875, p. 448.
Plectropoma huntii, *Hector, Tr. N. Zeal. Inst.* vii. 1875, p. 240, pl. x.
Gilbertia semicincta, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 347.
Gilbertia huntii, *Gill, Mem. Ac. Washingt.* vi. 1894, p. 116.

D. X 19–21. A. III 8. Sc. 50–55 $\frac{3-4}{21-24}$; l. l. 40–44.

Depth of body $2\frac{1}{2}$ to 3 times in total length, length of head $2\frac{1}{2}$ to $2\frac{2}{3}$ times. Snout a little longer than diameter of eye, which is $4\frac{1}{2}$ to 5 times in length of head; interorbital region flat, its width 7 to 9 times in length of head; jaws equal; maxillary extending to below centre of eye, the width of its distal extremity $\frac{2}{3}$ to $\frac{3}{4}$ diameter of eye; scales on cheek and opercle of moderate size, though not so large as on the body; præopercle with three strong antrorse spines on the lower border; two strong opercular spines. Gill-rakers nearly as long as gill-fringes, 12 or 13 on lower part of anterior arch. Dorsal originating above base of pectoral; fourth or fourth and fifth spines longest, about $\frac{2}{5}$ length of head, as long as or a little shorter than longest soft rays; tenth spine nearly as long as second, and about half as long as longest soft rays. Pectoral $\frac{2}{3}$ length of head, longer than ventral. Second anal spine stronger and longer than third, nearly as long as longest dorsal. Caudal truncate. Lateral line feebly marked. Red, with six or seven black cross-bands, which do not extend on the belly.

Total length 170 millim.

Coasts of South-eastern Australia, New Zealand, and Chili.

| | | |
|---|---|---|
| *a–b*. Ad. | Sydney. | G. Krefft, Esq. [P.]. |
| *c, d, e*. Ad., skins. | Australia. | |
| *f*. Ad. | Auckland. | Otago University Museum. |
| *g*. Ad. | ——? | Haslar Collection. |
| *h*. Ad., skel. | Sydney. | G. Krefft, Esq. [P.]. |

* This figure appears to me to have been executed partly from an authentic coloured sketch by Gay, partly from a specimen of *C. nigrorubra*.



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### 2. Gilbertia annulata.

Plectropoma annulatum, *Günth.* i. p. 415 (1859), *and in Brenchley, Curaçoa,* p. 415, pl. xxviii. fig. B (1873); *Casteln. Proc. Linn. Soc. N. S. W.* iii. 1878, p. 369.

D. X 17–18. A. III 7. Sc. 53–55 $\frac{6-7}{22-23}$; l. l. 43–45.

Depth of body 2½ to 2⅘ times in total length, length of head 2½ times. Snout as long as diameter of eye, which is 4½ times in length of head; interorbital region slightly convex, with strong, raised supraciliary ridges, its width 6 times in length of head; jaws equal; maxillary extending to below centre of eye, the width of its distal extremity ½ to ⅔ diameter of eye; scales on cheek of moderate size, on opercle nearly as large as on body; præopercle with two or three strong antrorse spines on the lower border; two strong opercular spines. Gill-rakers nearly as long as gill-fringes, 12 or 13 on lower part of anterior arch. Dorsal originating above base of pectoral; fourth or fourth and fifth spines longest, ⅓ to ⅖ length of head, a little longer than longest soft rays; tenth spine nearly as long as first and about ⅔ length of longest soft rays. Pectoral ⅔ to ¾ length of head, longer than ventral. Second anal spine stronger and longer than third, nearly as long as longest dorsal. Caudal rounded. Lateral line feebly marked. Red, with six black cross-bands, two below the spinous dorsal, two between the soft dorsal and the anal, and two on the caudal peduncle; the four last encircle the body; two Λ-shaped black bands from behind the eyes to the nape.

Total length 230 millim.

Port Jackson.

| | | |
|---|---|---|
| *a.* Ad. | Port Jackson. | Imperial Institute [P.]. |
| *b–c.* Ad. | Port Jackson. | R. Schütte, Esq. [P.]. |
| *d.* Ad., skin. | Australia. | |
| *e.* Ad. | —— ? | Haslar Collection. (Type.) |

### 3. Gilbertia nigrorubra.

Plectropoma nigrorubrum, *Cuv. & Val.* ii. p. 402 (1828); *Quoy & Gaim. Voy. Astrolabe, Zool.* iii. p. 659, *Poiss.* pl. iv. fig. 1 (1834); *Günth.* i. p. 158 (1859); *Douglas-Ogilby, Proc. Linn. Soc. N. S. W.* x. 1885, p. 119.

D. X 16–18. A. III 8. Sc. 60–65 $\frac{3-4}{26}$; l. l. 57–58.

Depth of body 2¾ to 3 times in total length, length of head 2⅔ times. Snout a little longer than diameter of eye, which is 5 to 6 times in length of head; interorbital region concave, about ½ diameter of eye; lower jaw slightly projecting; maxillary extending to below centre of eye, the width of its distal extremity ⅔ to ¾ diameter of eye; scales on the head very small; præopercle with two or three strong antrorse teeth on the lower border; two strong opercular spines. Gill-rakers rather short, 6 (and some rudiments) on lower part of anterior arch. Dorsal originating above base of

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pectoral; fourth spine longest, $\frac{1}{3}$ to $\frac{2}{5}$ length of head, as long as or a little shorter than longest soft rays; tenth spine nearly as long as second, not more than half length of longest soft rays. Pectoral $\frac{3}{4}$ length of head, longer than ventral. Second anal spine stronger but scarcely longer than third, considerably shorter than longest dorsal. Caudal rounded. Lateral line well marked, each scale with several tubules. Red, with four black bands encircling the body, the first below the 6th to 8th dorsal spines, the second from the anterior soft rays of the dorsal to the anal, the third below the last soft dorsal rays, the fourth on the caudal peduncle.

Total length 210 millim.

South and South-east coasts of Australia.

| | | |
|---|---|---|
| *a*. Ad. | Port Jackson. | Imperial Institute [P.]. |
| *b*. Ad., skin. | Swan River. | |
| *c*, *d*. Ad., skins. | —— ? | |

### 4. Gilbertia? armata.

Serranus armatus, *Casteln. Res. Fish. Austral.* p. 7 (1875).

D. X 20. A. III 7. Sc. 70.

Depth of body equal to length of head, about $2\frac{1}{2}$ times in total length. Diameter of eye $4\frac{1}{2}$ times in length of head; head covered with minute scales; maxillary naked; præopercle finely denticulate, the denticulations rather stronger on the lower edge, and slightly directed forwards; opercle with a strong, flat spine. Soft portion of dorsal deeper than the spinous. Anal spines of moderate size, third longest. Caudal slightly concave. Uniform reddish yellow, probably orange; fins more red, with their extremities darker.

Total length 280 millim.

Suran River.

## 31. COLPOGNATHUS.

Plectropoma, part., *Cuv. & Val.* ii. p. 387 (1828); *Günth. Cat.* i. p. 156 (1859); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 94 (1877).
Colpognathus, *Klunz. Sitzb. Ak. Wien*, lxxx. i. 1880, p. 339.

Body strongly compressed; scales small, rough on the border, denticulated. Lateral line complete, the tube short, bifurcate. Mouth large, protractile; maxillary exposed; jaws with villiform teeth, the inner of which are depressible, hinged, and with extremely large canines; narrow bands of teeth on vomer and palatines; tongue smooth. Head entirely scaly, maxillary and mandible included; præopercle finely denticulated, with a few small antrorse spines below; opercle with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present. Gill-rakers rather short. A single dorsal fin, scaly at the base, with X 18 rays, the spinous and soft portions equal in length. Anal short, with III 8 rays. Caudal truncate. Pectorals symmetrical, obtusely pointed, with 15 rays. Ventrals below pectorals, close together, with

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a strong spine. Posterior processes of præmaxillaries extending nearly to the frontals, interorbital region concave; top of cranium smooth and convex; no parietal crests, supraoccipital crest very short. Vertebræ 27 (10+17).

Southern Pacific Ocean.

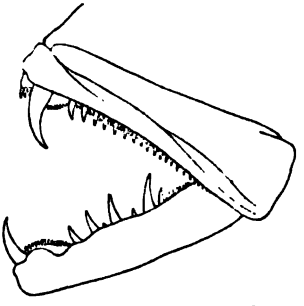

Fig. 21.—Dentition of *Colpognathus dentex*.

### 1. Colpognathus dentex.

Plectropoma dentex, *Cuv. & Val.* ii. p. 394 (1828); *Quoy & Gaim. Voy. Astrolabe, Zool.* iii. p. 660, *Poiss.* pl. iv. fig. 2 (1834); *Richards. Zool. Ereb. & Terr., Ichth.* p. 117, pl. lvii. figs. 3–5 (1848); *Günth.* i. p. 160 (1859); *Klunz. Sitzb. Ak. Wien,* lxxx. i. 1880, p. 337, pl. i. fig. 1.

Plectropoma richardsonii, *Günth. Proc. Zool. Soc.* 1861, p. 391, pl. xxxviii.

D. X 18. A. III 8. Sc. 95–115 $\frac{8-10}{35-40}$; l. l. 81–87.

Depth of body 3⅓ to 4 times in total length, length of head 2⅔ to 3 times. Snout longer than diameter of eye, which is 6 to 6½ times in length of head and equals at least twice interorbital width; lower jaw projecting; maxillary extending beyond vertical of posterior border of eye, the width of its distal extremity a little less than diameter of eye; præopercular border rounded; opercular spines strong. Gill-rakers shorter than gill-fringes, 8 (and some rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral, notched between spinous and soft portions; middle spines longest, ¼ to ⅓ length of head, shorter than longest (posterior) soft rays. Pectoral ⅔ length of head. Ventral shorter, not reaching anus. Anal spines strong, first shortest, second and third equal in length, nearly as long as third dorsal spine, half as long as longest soft rays. Caudal truncate. Olive, orange, or crimson, spotted or marbled with black; head and anterior part of body with small blue spots.

Total length 370 millim.

South coast of Australia.

| | | |
|---|---|---|
| *a*. Ad., stffd. | King George's Sound. | |
| *b*. Ad. | Freemantle. | (Type of *P. richardsonii*.) |
| *c*. Ad. | Adelaide. | |

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## 32. CÆSIOPERCA.

Anthias, part., *Günth. Cat.* i. p. 88 (1859).
Cæsioperca, *Casteln. Proc. Zool. Soc. Vict.* i. 1872, p. 49.

Body strongly compressed; scales moderate, rough on the border, denticulated. Lateral line complete, the tube short, bifurcate. Mouth moderate, protractile; maxillary exposed; jaws with villiform teeth and a few small canines; narrow bands of teeth on

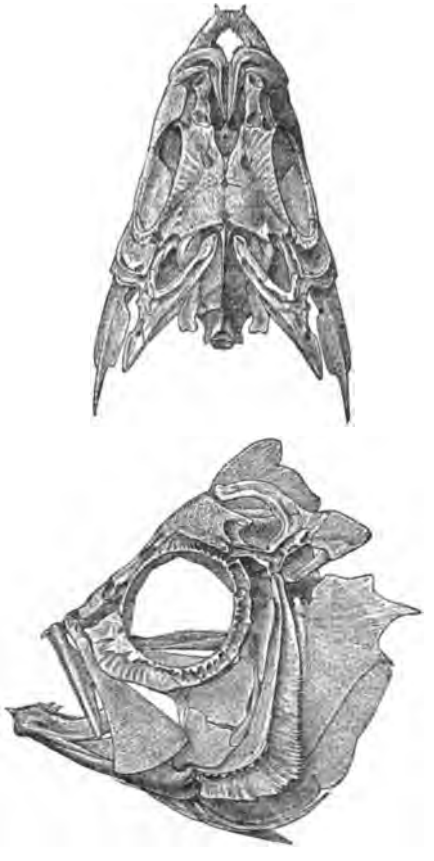

Fig. 22.—Upper and side views of skull of *Cæsioperca lepidoptera*.

vomer and palatines; tongue smooth; head entirely scaly, maxillary and mandible included; præopercle finely denticulate; opercle with two or three spines. Gill-membranes separate; seven or eight branchiostegals; pseudobranchiæ present. Gill-rakers long

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and slender. A single dorsal fin, closely scaled at the base, with X–XI 19–23 rays, the spinous and soft portions nearly equal in length. Anal short, with III 9–10 rays. Caudal emarginate. Pectoral nearly symmetrical, rounded or obtusely pointed; with 15–18 rays. Ventrals below pectorals, close together, with a strong spine. Posterior processes of præmaxillaries extending to between the frontals, which embrace a deep fossa in front; frontals very convex above, with a transverse ridge behind in front of the short but very strong supraoccipital crest; parietal crests feeble. Vertebræ 26 (10+16).

Southern Pacific Ocean.

*Synopsis of the Species.*

Depth of body $2\frac{1}{4}$ to $2\frac{1}{3}$ times in total length; sc. 65–70 $\frac{4-5}{23-30}$; a roundish blackish spot on each side ..... 1. *lepidoptera*, p. 312.

Depth of body $2\frac{2}{3}$ to $2\frac{4}{5}$ times in total length; sc. 54–60 $\frac{3-4}{19-21}$; a black vertical bar on each side.. 2. *rasor*, p. 313.

Depth of body 3 times in total length; sc. 62–63 $\frac{3}{16}$; no dark markings ..... 3. *extensa*, p. 313.

## 1. Cæsioperca lepidoptera.

Epinephelus lepidopterus (*Forst.*), *Bl. Schn. Syst.* p. 302 (1801).
Serranus lepidopterus, *Richards. Ann. & Mag. N. H.* ix. 1842, p. 18.
Perca lepidoptera, *Forst. Descr. Anim.* p. 138 (1844).
Scorpis hectori, *Hutton, Fish. N. Zeal.* p. 4, pl. i. fig. 4 (1872); *Günth. Zool. Rec.* 1872, p. 88; *Hutton, Tr. N. Zeal. Inst.* ix. 1876, p. 353.
Anthias richardsonii, *Günth. Proc. Zool. Soc.* 1869, p. 429.
Pseudanthias lepidopterus, *Gill, Mem. Ac. Washingt.* vi. 1894, p. 116.

D. X 19–21. A. III 9–10. Sc. 65–70 $\frac{4-5}{23-30}$; l.l. 54–65.

Depth of body $2\frac{1}{4}$ to $2\frac{1}{2}$ times in total length, length of head $3\frac{1}{3}$ to $3\frac{2}{3}$ times. Snout slightly shorter than diameter of eye, which is 3 to $3\frac{1}{2}$ times in length of head; interorbital width at least equal to orbital diameter; maxillary extending to below centre or posterior third of eye, the width of its distal extremity $\frac{2}{3}$ to $\frac{4}{5}$ diameter of eye; serræ of præopercle slightly enlarged at angle, which is rounded; two strong opercular spines. Gill-rakers longer than gill-fringes, 27–30 on lower part of anterior arch. Dorsal originating above post-temporal; spines strong, not very unequal, increasing in length to the third or fourth, which is nearly half length of head, and as long as or a little longer than the soft rays; no notch between spinous and soft portions. Pectoral $1\frac{1}{5}$ to $1\frac{1}{3}$ length of head. Ventral about $\frac{2}{3}$ length of pectoral, not reaching anus. Anal spines strong, first shortest, second and third nearly equal and nearly as long as longest dorsal spine. Caudal with the

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margin excised. Lateral line forming an angle below last dorsal rays. Light brownish or reddish; a bluish streak below the eye, and a roundish or squarish blackish spot on each side below the lateral line and behind the extremity of the pectoral.

Total length 260 millim.

Coasts of Tasmania and New Zealand.

| | | |
|---|---|---|
| *a–b*. Ad. | Tasmania. | (Types of *A. richardsonii*.) |
| *c–e*. Ad. & hgr. | Tasmania. | Morton Allport, Esq. [P.]. |
| *f–g*. Ad. | Hobart. | Morton Allport, Esq. [P.]. |
| *h*. Hgr. | Otago. | Otago University. |
| *i*. Ad., skel. | Tasmania. | Morton Allport, Esq. [P.]. |

### 2. Cæsioperca rasor.

Serranus rasor, *Richards. Proc. Zool. Soc.* 1839, p. 95, *and Tr. Zool. Soc.* v. 1849, p. 73, pl. iv. fig. 1.
Anthias rasor, *Günth.* i. p. 93 (1859).
Cæsioperca rasor, *Casteln. Proc. Zool. Soc. Vict.* i. 1872, p. 40.

D. X 20–21. A. III 9. Sc. 54–60 $\frac{3-4}{19-21}$; l. l. 51–55.

Depth of body $2\frac{3}{5}$ to $2\frac{1}{3}$ times in total length, length of head $3\frac{1}{2}$ times. Snout as long as diameter of eye, which is 4 to $4\frac{1}{2}$ times in length of head, and less than interorbital width; maxillary extending to below centre or posterior third of eye, the width of its distal extremity $\frac{3}{4}$ or $\frac{4}{5}$ diameter of eye; serræ of præopercle slightly enlarged at angle, which is rounded; two strong opercular spines. 30 gill-rakers on lower part of anterior arch. Dorsal originating above base of pectoral; spines strong, not very unequal, increasing in length to the third or fourth, which is $\frac{1}{3}$ to $\frac{2}{5}$ length of head, and as long as or a little shorter than the soft rays; no notch between spinous and soft portions. Pectoral $1\frac{1}{6}$ to $1\frac{1}{4}$ length of head. Ventral about $\frac{3}{5}$ length of pectoral, not reaching anus. Anal spines strong, first shortest, second and third nearly equal and nearly as long as longest dorsal spine. Caudal with the margin excised. Lateral line forming an angle on caudal peduncle. Light reddish brown, purplish on the back, with more or less distinct golden stripes; a bluish streak below the eye; a vertical black bar on each side, below the lateral line, covered by the extremity of the pectoral.

Total length 215 millim.

Coasts of South Australia and Tasmania.

| | | |
|---|---|---|
| *a–b*. Ad. | Tasmania. | Morton Allport, Esq. [P.]. |
| *c*. Ad. | Tasmania. | |

### 3. Cæsioperca extensa.

Anthias rasor, var. extensa, *Klunz. Arch. f. Nat.* 1872, p. 17.
Anthias extensus, *Klunz. Sitzb. Ak. Wien*, lxxx. i. 1880, p. 339, pl. ii.

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D. X–XI 21–23. A. III 9. Sc. 62–63 $\frac{3}{16}$.

Depth of body 3 times in total length, length of head $3\frac{2}{5}$ times. Snout slightly shorter than diameter of eye, which is $3\frac{2}{3}$ times in length of head; maxillary extending to below centre of eye, the width of its distal extremity $\frac{3}{4}$ diameter of eye; serræ of præopercle slightly enlarged at angle, which is rounded; three strong opercular spines. Dorsal originating above base of pectoral; spines subequal, the longest about $\frac{1}{4}$ length of head, and a little shorter than the soft rays; no notch between spinous and soft portions. Pectoral $1\frac{1}{4}$ length of head. Ventral about $\frac{2}{3}$ length of pectoral, not reaching anus. First anal spine shortest, second and third equal and about as long as longest dorsals. Caudal with the margin excised. Coloration uniform, reddish above the lateral line.

Total length 200 millim.

Hobson Bay, S. Australia.

## 33. CAPRODON.

Caprodon, *Temm. & Schleg. Faun. Japon., Pisc.* p. 64 (1844); *Bleek. Arch. Néerl.* xi. 1876, p. 252.
Anthias, part., *Günth. Cat.* i. p. 88 (1859).
Neoanthias, *Casteln. Proc. Linn. Soc. N. S. W.* iii. 1878, p. 366.

Body strongly compressed; scales rather large, rough on the border, denticulated. Lateral line complete, the tube bifurcate. Mouth rather large, protractile; maxillary exposed; jaws with villiform teeth and a few small canines; large, elongate patches of teeth on vomer, palatines, entopterygoids, and tongue; head entirely scaly, maxillary and mandible included; præopercle finely denticulate; opercle with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present. Gill-rakers long and slender. A single dorsal fin, closely scaly at the base, with X 19–20 rays, the spinous and soft portions nearly equal in length. Anal short, with III 8–9 rays. Caudal truncate or emarginate. Pectorals long, obtusely pointed, asymmetrical, the lowest middle rays longest, with 18–19 rays. Ventrals below pectorals, close together, with a strong spine. Posterior processes of præmaxillaries extending to between the frontals, which embrace a deep fossa in front; frontals with a transverse ridge between the posterior borders of the orbits, in front of the short but very strong supraoccipital crest; parietal crests feeble. Vertebræ 26 (10+16).

Pacific Ocean.

### 1. Caprodon schlegelii.

Caprodon, *Temm. & Schleg. Faun. Japon., Pisc.* p. 64, pl. xxx. (1844).
Anthias schlegelii, *Günth.* i. p. 93 (1859).
Caprodon schlegelii, *Kaup, Nederl. Tijdschr. Dierk.* i. 1863, p. 20.
Anthias (Caprodon) schlegelii, *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 225.

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D. X 20. A. III 8–9.

Depth of body $2\frac{3}{5}$ to $2\frac{2}{3}$ times in total length, length of head $3\frac{1}{2}$ times. Snout a little longer than diameter of eye, which is 4 to $4\frac{1}{3}$ times in length of head; maxillary extending to below centre of eye, the width of its distal extremity $\frac{2}{3}$ diameter of eye. Dorsal spines increasing in length to the third, which is about $\frac{1}{3}$ length of head, and about half as long as longest posterior soft rays; no notch between spinous and soft portions; latter pointed. Pectoral $1\frac{1}{3}$ length of head. Anal spines strong, first shortest, second and third subequal; soft portion pointed. Caudal not notched, with slightly convex posterior border. Scales apparently as in *C. longimanus*. Pink, with two yellow stripes in front of the eye and another running obliquely from below the eye to the base of the pectoral; anal fin with round yellow spots; a few irregular black blotches on spinous dorsal.

Total length 370 millim.

Sea of Japan.

### 2. Caprodon longimanus. (Plate XII.)

Anthias longimanus, *Günth.* i. p. 94 (1859); *Ramsay, Proc. Linn. Soc. N. S. W.* v. 1880, p. 294; *Tenison-Woods, Fish. N. S. W.* p. 33, pl. iii. (1882); *Hutton, Tr. N. Zeal. Inst.* xxii. 1890, p. 275.

Caprodon longimanus, *Kaup, Nederl. Tijdschr. Dierk.* i. 1863, p. 20.

Scorpis hectori (*non Hutt.* 1872), *Hutton, Tr. N. Zeal. Inst.* v. 1873, p. 259, pl. vii. fig. 1.

Scorpis fairchildi, *Hector, Tr. N. Zeal. Inst.* vii. 1875, p. 241.

Neoanthias guentheri, *Casteln. Proc. Linn. Soc. N. S. W.* iii. 1878, p. 367.

Caprodon schlegelii (*non Günth.*), *Douglas-Ogilby, Proc. Linn. Soc. N. S. W.* x. 1885, p. 231.

Pseudanthias longimanus, *Gill, Mem. Ac. Washingt.* vi. 1894, p. 116.

D. X 19–20. A. III 8. Sc. 68–75 $\frac{6}{23-25}$; l. l. 63–65.

Depth of body $2\frac{3}{5}$ to 3 times in total length, length of head $3\frac{2}{5}$ to $3\frac{3}{4}$ times. Snout as long as or a little shorter than diameter of eye, which is $3\frac{1}{2}$ to 4 times in length of head; interorbital width at least equal to diameter of eye; maxillary extending to nearly below centre of eye, the width of its distal extremity $\frac{3}{5}$ to $\frac{2}{3}$ diameter of eye. 26 gill-rakers on lower part of anterior arch. Dorsal spines increasing in length to the third or fourth, which is about $\frac{2}{5}$ length of head, and about as long as the soft rays; no notch between spinous and soft portions. Pectoral $1\frac{1}{3}$ to $1\frac{1}{2}$ length of head. Ventral shorter than head, not reaching anal. Anal spines strong, first shortest, second and third subequal and a little shorter than longest dorsal spines. Caudal emarginate. Pink, with yellow spots or irregular oblique stripes; two yellow stripes in front of the eye, and another running obliquely from below the eye to the base of the pectoral; dorsal and anal yellow and red, the former sometimes with irregular black blotches.

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Total length 385 millim.
South Pacific Ocean (New South Wales, New Zealand, Chili).

| | | |
|---|---|---|
| *a–b.** Ad. | Port Jackson. | Imperial Institute [P.]. |
| *c, d.* Ad. & hgr., stfd. | Juan Fernandez. | Government of Chili [P.]. |
| *e.* Ad., skin. | ——? | Zoological Society. (Type.) |

## 34. HOLANTHIAS.

Serranus, part., *Cuv. & Val.* ii. p. 210 (1828).
Anthias, part., *Günth. Cat.* i. p. 88 (1859).
Holanthias, *Günth. Proc. Zool. Soc.* 1868, p. 226; *Bleek. Nederl. Tijdschr. Dierk.* iv. 1872, p. 156.
Odontanthias, part., *Bleek. t. c.* p. 235, *and Atlas Ichthyol.* vii. p. 20 (1876); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 415.

Body strongly compressed; scales moderate or rather large, ciliated, smooth. Lateral line complete, the tube straight or with an ascending tubule, and extending along nearly the entire scale. Mouth rather large, protractile; maxillary exposed; jaws with villiform teeth and curved canines; elongate patches of teeth on vomer, palatines, entopterygoids, and tongue; head entirely scaly, maxillary and mandible included; præopercle serrated, without antrorse teeth on the lower border; opercle with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present. Gill-rakers very long and slender. A single dorsal fin, with X 15–17 rays, the spinous portion as long as or a little longer than the soft. Anal short, with III 6–7 rays. Caudal entire or emarginate. Pectorals obtusely pointed, asymmetrical, the lower middle rays longest; rays 17–20. Ventrals below pectorals, close together, with a strong spine. Posterior processes of præmaxillaries not reaching frontals, which are very convex behind; parietal and supraoccipital bones extending to between the orbits; supraoccipital crest strong, not produced on the frontals. Vertebræ 26 (10+16).

Tropical Atlantic and Indian Oceans.

### *Synopsis of the Species.*

I. Dorsal without scales, or with narrow strips of scales between the soft rays; 4 or 5 scales between first dorsal spine and lateral line.

| | |
|---|---|
| Caudal with convex posterior border; lateral line 53–55, separated from middle dorsal spines by 3 scales ..... | 1. *fronticinctus*, p. 317. |
| Caudal truncate, with outer rays much produced; lateral line 35–40, separated from middle dorsal spines by 2 scales ..... | 2. *martinicensis*, p. 317. |

* One side of one of the specimens has been dissected in order to examine the skeleton.

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II. Soft dorsal closely scaly at base; 6 or 7 scales between first dorsal spine and lateral line; caudal crescentic.

| | |
|---|---|
| Third dorsal spine longest; lateral line 39–44, separated from middle dorsal spines by 3 scales | 3. *borbonius*, p. 318. |
| Fourth dorsal spine longest; lateral line 37–39, separated from middle dorsal spines by 2 scales | 4. *chrysostictus*, p. 319. |

### 1. Holanthias fronticinctus.

Anthias fronticinctus, *Günth. Proc. Zool. Soc.* 1868, p. 226, pl. xviii.

D. X 15–16. A. III 7. Sc. 55 $\frac{3}{19-20}$; l. l. 53–55.

Depth of body $2\frac{4}{5}$ to 3 times in total length, length of head $3\frac{2}{3}$ times. Snout $\frac{2}{3}$ diameter of eye, which is $3\frac{1}{2}$ times in length of head and equals interorbital width; lower jaw slightly projecting; maxillary extending to below centre of eye, the width of its distal extremity $\frac{2}{3}$ to $\frac{3}{4}$ diameter of eye; posterior border of præopercle finely serrated, the serræ enlarged at the angle; middle opercular spine strong. 27 gill-rakers on lower part of anterior arch. Dorsal originating above opercular cleft; first and second spines shortest, rest subequal and slightly shorter than the soft rays; no notch between spinous and soft portions. Pectoral as long as or slightly longer than head. Ventral a little shorter, with the third ray more or less produced, filiform, reaching anus or anal fin. Anal spines strong, first short, second slightly shorter than third, which equals longest dorsal spine; third soft ray somewhat produced. Caudal with convex posterior border. Lateral line forming an angle on caudal peduncle. Golden yellow (in spirit); three white cross-bars on head, first from eye to eye across snout, second across interorbital region, third on occiput; a white line along base of dorsal fin, which is white-edged.

Total length 220 millim.

South Mid-Atlantic.

| | | |
|---|---|---|
| *a–b*. Ad. | St. Helena. | J. C. Melliss, Esq. [P.]. (Types.) |

### 2. Holanthias martinicensis.*

Aylopon martinicensis, *Guichen. Ann. Soc. Linn. Maine-et-Loire*, x. 1868, p. 85.

Anthias martinicensis, *Jord. Proc. U.S. Nat. Mus.* ix. 1886, p. 533.

Odontanthias martinicensis, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 415.

D. X 15. A. III 7. Sc. 38–41 $\frac{2}{15-17}$; l. l. 35–40.

Depth of body $2\frac{1}{2}$ to 3 times in total length, length of head 3 times. Snout $\frac{3}{5}$ diameter of eye, which is $3\frac{1}{3}$ times in length of

* Type specimens (Paris Mus. no. 4319) examined.

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head and a little exceeds interorbital width; lower jaw projecting; maxillary extending to below posterior third of eye, the width of its distal extremity $\frac{3}{5}$ to $\frac{2}{3}$ diameter of eye; posterior border of præopercle finely serrated, the serræ enlarged at the angle; middle opercular spine strong. 25 to 27 gill-rakers on lower part of anterior arch. Dorsal originating above opercular cleft; first and second spines shortest, third longest, $1\frac{1}{2}$ as long as the following ones, which are equal; soft dorsal rounded, deepest posteriorly; no notch between spinous and soft portions. Pectoral as long as head, a little longer than ventral; latter reaching origin of anal. Anal spines strong, first short, second and third equal and as long as last dorsal spine; fourth and fifth soft rays longest. Caudal truncate, with the outer rays much produced. Lateral line forming an angle below last dorsal rays. Reddish golden, with lighter spots; snout and vertex whitish (red?), this colour extending as a stripe on the nape to the first dorsal spine, where it terminates in a point.

Total length 160 millim.

Caribbean Sea (Martinique, Barbados).

*a*. Ad. Barbados.

### 3. Holanthias borbonius.

Serranus borbonius, *Cuv. & Val.* ii. p. 263 (1828).
Serranus delissii, *Bennett, Proc. Zool. Soc.* 1831, p. 126.
Anthias borbonius, *Günth.* i. p. 89 (1859).
Aylopon mauritianus, *Guichen. Ann. Soc. Linn. Maine-et-Loire*, x. 1868, p. 86.
Odontanthias borbonius, *Bleek. in Pollen & Van Dam, Rech. Faune Madag.* iv. p. 16, pl. v. fig. 1 (1874).
Anthias (Odontanthias) borbonius, *Sauv. Hist. Madag., Poiss.* p. 134, pl. xvii. fig. 2 (1891).

D. X 16–17. A. III 6–7. Sc. 45–48 $\frac{3}{20-23}$; l. l. 39–44.

Depth of body 2 to $2\frac{1}{3}$ times in total length, length of head $2\frac{3}{4}$ to 3 times. Snout very short, half diameter of eye, which is $2\frac{1}{2}$ to 3 times in length of head, and a little exceeds interorbital width; lower jaw projecting; maxillary extending to below centre or posterior third of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye; a strong spine at angle of præopercle; sub- and interopercle strongly serrated; middle opercular spine strong. 28 to 30 gill-rakers on lower part of anterior arch. Dorsal originating above præopercular border; first spine shortest, third longest and tipped with a dermal filament, second and tenth equal; soft dorsal scaly at base, anterior rays more or less produced; no notch between spinous and soft portions. Pectoral as long as or slightly shorter than head, a little shorter than ventral; latter reaching origin of anal or a little beyond. Anal spines strong, first short, second and third equal and about as long as fourth dorsal spine; first, second, and third soft rays longest. Caudal crescentic, with the outer rays more or less produced. Lateral line forming an

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angle below last dorsal rays. Rosy to crimson; body with dark blotches separated by a light network; three yellow stripes on each side of the head.

Total length 120 millim.

Sea of Mauritius and Bourbon.

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| *a*. Ad. | Mauritius. | Zoological Society. (Type of *S. delissii*.) |
| *b*. Ad. | Mauritius. | M. V. de Robillard [C.]. |
| *c–d*, *e–g*. Ad. | Mauritius. | |
| *h*. Ad., skel. | Mauritius. | |

### 4. Holanthias chrysostictus.

Anthias chrysostictus, *Günth. Proc. Zool. Soc.* 1871, p. 655, pl. lvi.
Odontanthias chrysostictus, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1872, p. 237, *and Atl. Ichth.* vii. p. 21 (1876).

D. X 15–16. A. III 7. Sc. 47–48 $\frac{2}{20}$; l.l. 37–39.

Depth of body $2\frac{1}{4}$ times in total length, length of head 3 times. Snout very short, half diameter of eye, which is $2\frac{2}{3}$ to 3 times in length of head, and a little exceeds interorbital width; lower jaw projecting; maxillary extending to below centre of eye, the width of its distal extremity half diameter of eye; a strong spine at angle of præopercle; sub- and interopercle serrated; middle opercular spine strong. 27 gill-rakers on lower part of anterior arch. Dorsal originating above post-temporal; spines increasing in length to the fourth, rest equal; soft dorsal scaly at base, anterior rays longest, third produced in a long filament; no notch between spinous and soft portions. Pectoral as long as head, as long as ventral; latter reaching origin of anal. Anal spines strong, first short, second and third equal and as long as fourth dorsal spine; first and second soft rays produced. Caudal crescentic, with the outer rays much produced. Lateral line forming an angle below last dorsal rays. Rose-coloured, each scale with a bright yellow centre; upper part of head yellow, with a pink spot between the nostrils; an oblique bright yellow stripe from below the eye to the base of the pectoral; soft dorsal yellow, with oblique violet stripes; caudal yellow, with the upper and lower margins and the central rays pinkish violet.

Total length 180 millim

Sea of Celebes.

| | | |
|---|---|---|
| *a–b*. Ad. | Manado, Celebes. | Dr. A. B. Meyer [C.]. (Types.) |

## 35. ODONTANTHIAS.

Odontanthias, part., *Bleek. Nederl. Tijdschr. Dierk.* iv. 1872, p. 235, *and Atlas Ichthyol.* vii. p. 20 (1876).
Odontanthias, *Bleek. Arch. Néerl.* xi. 1876, p. 252.

Body strongly compressed; scales rather large, ciliated, smooth.

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Lateral line complete, the tube straight, and extending along nearly the entire scale. Mouth rather large, protractile; maxillary exposed; jaws with villiform teeth and curved canines; large, elongate patches of teeth on vomer, palatine, and tongue; head scaly, including the maxillary; præopercle serrated, without antrorse teeth on the lower border; opercle with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present. Gill-rakers very long and slender. A single dorsal fin, with X 13 rays, the spinous portion a little longer than the soft. Anal short, with III 7 rays. Caudal emarginate. Pectoral obtuse-pointed, subsymmetrical; rays 17. Ventrals below pectorals, close together, with a strong spine.

Sea of Celebes.

### 1. Odontanthias rhodopeplus.

Anthias rhodopeplus, *Günth. Proc. Zool. Soc.* 1871, p. 654, pl. lv.
Odontanthias rhodopeplus, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1872, p. 236.

D. X 13. A. III 7. Sc. 45 $\frac{2}{17}$; l. l. 30.

Depth of body $2\frac{1}{2}$ times in total length, length of head $2\frac{2}{3}$ times. Diameter of eye twice length of snout, a little more than interorbital width, and one third length of head; lower jaw projecting; maxillary extending to below posterior fourth of eye, the width of its distal extremity $\frac{2}{3}$ diameter of eye; one or two strong spines at angle of præopercle; middle opercular spine strong. 30 gill-rakers on lower part of anterior arch. Dorsal originating above post-temporal; first spine short, second half as long as third, which is a little longer than the following, and ends in a short filament; second to sixth soft rays long, much longer than dorsal spines, posterior short; no notch between spinous and soft portions. Pectoral a little shorter than head. Ventral as long as head, reaching a little beyond origin of anal. Anal spines strong, first short, second and third equal, as long as last dorsal spine; soft portion rounded. Caudal crescentic. Lateral line forming an angle below last dorsal rays. Rose-coloured on the sides; an oblique yellow stripe from below the eye to the belly; back and caudal peduncle golden yellow; back of tail pinkish violet; base of caudal blackish brown; fins reddish-rose-coloured, the soft dorsal rays barred with brown.

Total length 155 millim.

Celebes.

*a*. Ad. Manado, Celebes. Dr. A. B. Meyer [C.]. (Type.)

## 36. ANTHIAS.

Anthias, part., *Bloch, Ausl. Fische*, vi. p. 97 (1792); *Günth. Cat.* i. p. 88 (1859); *Guichen. Ann. Soc. Linn. Maine-et-Loire*, x. 1868, p. 80.

Aylopon, *Rafin. Caratt. N. Gen. Anim. Sicil.* p. 52 (1810); *Guichen. l. c.*

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Serranus, part., *Cuv. Règne Anim.* ii. p. 276 (1817); *Cuv. & Val.* ii. p. 210 (1828).
Anthias, *Cuv. Règne Anim.* 2nd ed. ii. p. 140 (1829); *Bleek. Arch. Néerl.* xi. 1876, p. 251; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 414.
Pronotogrammus, *Gill, Proc. Ac. Philad.* 1863, p. 81; *Jord. & Eigenm. l. c.* p. 411.
Pseudanthias, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1872, p. 156, *Arch. Néerl.* xi. 1876, p. 252, *and Atl. Ichth.* vii. p. 16 (1876).
Hemanthias, *Steind. Sitzb. Ak. Wien*, lxx. i. 1874, p. 378.
Odontanthias, part., *Jord. & Eigenm. l. c.* p. 415.

Body strongly compressed; scales moderate or rather large, ciliated, smooth. Lateral line complete, the tube straight or with an ascending tubule, and extending along nearly the entire scale. Mouth large, protractile; maxillary exposed; jaws with villiform teeth intermixed with curved canines; a small group of teeth on the vomer and a narrow series on each palatine; tongue smooth or with a few teeth; head partly or entirely scaled; præopercle serrated, without antrorse teeth on the lower border; opercle with two or three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers very long and slender. A single dorsal fin, with X 14–18 rays, the spinous portion a little longer or a little shorter than the soft. Anal short, with III 6–8 rays. Caudal emarginate. Pectorals pointed, subsymmetrical; rays 17–18. Ventrals below pectorals, close together, with a strong spine. Posterior processes of præmaxillaries extending to between the frontals, which embrace a deep fossa in front; frontals very convex, with a transverse ridge behind, between the posterior borders of the orbits and in front of the very strong supraoccipital crest; parietal crests feeble. Vertebræ 25–26 (10+15–16).

Tropical and Subtropical Seas.

*Synopsis of the Species.*

I. Snout, interorbital region, and maxillary naked; dorsal with 14 or 15 soft rays.

A. 4 scales between middle dorsal spines and lateral line; l. l. 54–56.
1. *peruanus*, p. 322.

B. 3 scales between middle dorsal spines and lateral line, which forms an angle below the hinder dorsal rays.

L. l. 48–50; third anal spine longest; snout as long as or a little shorter than the eye ..... 2. *vivanus*, p. 323.
L. l. 45; second anal spine longest; snout less than half diameter of eye ..... 3. *multifasciatus*, [p. 323.
L. l. 38; third anal spine longest; snout much shorter than eye ..... 4. *eos*, p. 324.

II. Snout, interorbital region, and maxillary scaly.

A. Lateral line forming an angle below the hinder dorsal rays; caudal crescentic.



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1. 4 scales between first dorsal spine and lateral line, 2 or 3 between middle dorsal spines and lateral line.

*a*. Dorsal with 12 soft rays, anal with 6.. 5. *tonsor*, p. 324.

*b*. Dorsal with 14 or 15 soft rays, anal with 7 or 8.

*α*. Ventral with the anterior rays much produced in the adult.

Third dorsal spine produced in the adult; diameter of eye at least one third length of head ..... 6. *sacer*, p. 324.

Third dorsal spine not produced; diameter of eye not one third length of head ..... 7. *asperilinguis*, [p. 326.

*β*. Ventrals not produced, hardly reaching anal. 8. *formosus*, p. 326.

2. 6 scales between first dorsal spine and lateral line, 4 between middle dorsal spines and lateral line; dorsal with 17 or 18 soft rays..... 9. *margaritaceus*, [p. 327.

B. Lateral line curved below hinder dorsal rays.

*a*. 3 or 4 scales between first dorsal spine and lateral line, 2 or 3 between middle dorsal spines and lateral line; caudal with truncate or crescentically emarginate border, the outer rays more or less produced.

Dorsal with 15 soft rays; l. l. 35..... 10. *japonicus*, p. 328.

Dorsal with 16 soft rays; l. l. 45..... 11. *cichlops*, p. 328.

Dorsal with 17 or 18 soft rays; l. l. 40–44; soft dorsal and anal pointed ..... 12. *squamipinnis*, [p. 329.

Dorsal with 17 soft rays, rounded; l. l. 45; caudal feebly emarginate ..... 13. *manadensis*, p. 329.

Dorsal with 17 soft rays; l. l. 37; caudal crescentic ..... 14. *huchtii*, p. 329.

*b*. 5 or 6 scales between first dorsal spine and lateral line, 4 between middle dorsal spines and lateral line.

Dorsal with 16 soft rays; l. l. 45; caudal crescentic ..... 15. *hypselosoma*, p. 330.

Dorsal with 17 soft rays; l. l. 48–52; caudal angularly emarginate ..... 16. *pleurotænia*, p. 331.

## 1. Anthias peruanus.

Anthias (Hemanthias) peruanus, *Steind. Sitzb. Ak. Wien*, lxx. i. 1874, p. 378.

Pronotogrammus peruanus, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 413.

D. X 14–15. A. III 8. Sc. 54–56 $\frac{4}{20-21}$.

Depth of body 3 to $3\frac{1}{6}$ times in total length, length of head $2\frac{5}{6}$ to 3 times. Snout naked, a little shorter than the eye, the diameter of which is $4\frac{1}{4}$ times in length of head; interorbital region naked, flattish, with two bony ridges and a median depression; lower jaw projecting, naked; maxillary naked, the width of its distal extremity $\frac{3}{4}$ diameter of eye; præopercle sharply serrate, its angle a right angle, with two enlarged serræ; two opercular spines. 23 gill-rakers on lower part of anterior arch. Third dorsal spine very long, at least nearly as long as head, rest low and rather slender;

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last soft rays very long. Pectoral considerably shorter than head. Ventral elongate, third ray longer than head. Third anal spine longest; penultimate soft ray long. Caudal deeply notched, with the outer rays produced into filaments. Rose-red, with small diffuse golden-brown spots on body and on soft dorsal, caudal, and anal.

Total length 380 millim.

Coast of Peru and Chili.

### 2. Anthias vivanus.

Anthias vivanus, *Jord. & Swain, Proc. U.S. Nat. Mus.* vii. 1884, p. 544.

Pronotogrammus vivanus, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 413.

D. X 14–15. A. III 7–8. Sc. 53 $\frac{3}{20}$; l. l. 48–50.

Depth of body 3⅓ to 3½ times in total length, length of head 3½ times. Snout naked, as long as or a little shorter than eye, which is 3 to 3½ times in length of head; interorbital space naked, as broad as diameter of eye; lower jaw projecting, naked; maxillary naked, extending to below centre of eye, the width of its distal extremity ⅔ diameter of eye; enlarged serræ at angle of præopercle; three opercular spines. Gill-rakers about 30 on lower part of anterior arch. Dorsal originating above opercular cleft; spines increasing in size to the fourth, which is a little longer than fifth and ends in a long dermal filament; soft rays produced into filaments; a slight notch between spinous and soft portions. Pectoral slightly shorter than head. Ventral longer, reaching origin of anal. Anal spines rather strong, first short, third a little longer than second. Caudal crescentic, outer rays much produced. Lateral line forming an angle below the last dorsal rays. Body carmine, freckled with golden olive; a bright golden stripe from eye to base of pectoral; dorsal and caudal carmine, the rays tinged with golden; anal golden; pectorals carmine; ventrals red and yellow.

Total length 110 millim.

Gulf of Mexico.

*a*. Ad. Pensacola, Florida. Prof. D. S. Jordan.

### 3. Anthias multifasciatus.

Pronotogrammus multifasciatus, *Gill, Proc. Ac. Philad.* 1863, p. 81; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 413.

Anthias multifasciatus, *Jord. & Gilb. Proc. U.S. Nat. Mus.* v. 1882, p. 360.

D. X 15. A. III 7. Sc. 45 $\frac{3}{17}$.

Snout naked, less than half diameter of eye, which is ⅓ length of head; maxillary naked; a strong spine at angle of præopercle. Fourth dorsal spine longest; a notch between spinous and soft portions. Second anal spine considerably longer than third. Caudal



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forked. Lateral line forming an angle below last dorsal rays. Tawny yellow, with numerous dark cross-bands.

Total length 55 millim. (young).

Pacific coast of Mexico.

### 4. Anthias eos.

Pronotogrammus eos, *Gilbert*, *Proc. U.S. Nat. Mus.* xiii. 1890, p. 62; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 413.

D. X 15. A. III 8. Sc. 38 $\frac{3}{-}$.

Depth of body $2\frac{4}{5}$ to 3 times in total length, length of head $2\frac{1}{2}$ to $2\frac{2}{3}$ times. Snout naked, much shorter than diameter of eye, which is 3 times in length of head; lower jaw not projecting, naked; maxillary naked, extending to below centre of eye; interorbital region naked, somewhat concave, with supraorbital ridges; angle of præopercle slightly projecting, its serræ coarser. 30 gill-rakers on lower part of anterior arch. Dorsal spines slender, none of them produced or filamentous, sixth longest, each with a short membranous flap; soft rays long; a slight notch between spinous and soft portions. Pectoral shorter than head. Third anal spine longest. Caudal forked. Lateral line forming an angle below last dorsal rays. Rose-red, silvery below, the fins light yellow; a dark spot above the middle of each eye and two V-shaped olive marks behind head, the apex of the one at the nape, the other at front of dorsal.

Total length 175 millim.

Pacific coast of Mexico.

### 5. Anthias tonsor.

Serranus tonsor, *Cuv. & Val.* ii. p. 262 (1828).

Anthias tonsor, *Günth.* i. p. 91 (1859).

Odontanthias? tonsor, *Jord. & Eigenm. Bull. U.S. Nat. Mus.* viii. 1890, p. 416.

This species, the type of which appears to be lost, is stated to differ from *A. sacer* only in having the præopercular serræ stronger, the ventrals longer, 16 soft dorsal rays, and 6 soft anal rays.

Coast of Brazil.

### 6. Anthias sacer.

*Bloch, Schrift. Ges. naturf. Fr. Berl.* x. 1802, p. 422, pl. ix. fig. 1.

Labrus anthias, part., *Linn. S. N.* i. p. 474 (1766).

Anthias sacer, *Bloch, Ausl. Fische*, vi. p. 99, pl. cccxv. (1792); *Bonap. Icon. Faun. Ital., Pesci*, pl. i. fig. 2 (1832); *Lowe, Fish. Mad.* p. 19, pl. iv. (1843); *Günth.* i. p. 88 (1859); *Steind. Sitzb. Ak. Wien*, lvi. i. 1867, p. 608; *Canestr. Faun. Ital., Pesci*, p. 76 (1874); *Moreau, Poiss. France*, ii. p. 372, fig. (1881); *Doderl. Man. Ittiol. Mediterr.* iv. p. 82 (1889); *Osorio, Jorn. Sc. Lisb.* (2) ii. 1891, p. 99.

Lutjanus anthias, *Lacép. Poiss.* iv. p. 197 (1802); *Risso, Ichth. Nice*, p. 260 (1810).

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Serranus anthias, *Cuv. & Val.* ii. p. 249, pl. xxxi. (1828).
Aylopon ivicæ, *Guichen. Ann. Soc. Linn. Maine-et-Loire*, x. 1868, p. 81.
Aylopon hispanus, *Guichen. l. c.*
Aylopon rissoi, *Guichen. l. c.* p. 82.
Aylopon nicæensis, *Guichen. l. c.* p. 83.
Aylopon canariensis, *Guichen. l. c.* p. 84.
Aylopon algeriensis, *Guichen. l. c.*
Anthias sacer, var. brevipes, *Bellotti, Atti Soc. Ital. Sc. Nat.* xxii. 1879, p. 36.
Anthias anthias, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 414.
Anthias mundulus, *Johnson, Proc. Zool. Soc.* 1890, p. 452.

D. X 14–15. A. III 7. Sc. 40–43 $\frac{2-3}{15-17}$; l. l. 38–40.

Depth of body $2\frac{2}{5}$ to 3 times in total length, length of head 3 to $3\frac{1}{5}$ times. Snout convex, scaly, shorter than diameter of eye, which is 3 to $3\frac{1}{2}$ times in length of head, and equals or slightly exceeds interorbital width; lower jaw projecting, naked or scaly; maxillary scaly, extending to below centre or posterior third of eye, the width of its distal extremity $\frac{2}{3}$ to $\frac{1}{2}$ diameter of eye; serræ at angle of præopercle enlarged; three opercular spines. 30–35 gill-rakers on lower part of anterior arch. Dorsal originating above opercular cleft; first and second spines shortest, third longest in the adult, once and a half to twice as long as the fourth, and produced in a long dermal lobe or filament; no notch between spinous and soft portions; soft rays long, increasing in size to the posterior fourth of the fin in the adult, the fin more rounded in the half-grown and young. Pectoral nearly as long as head. Ventral much produced in the adult, the longest rays reaching caudal peduncle or caudal fin. Anal spines strong, first short, third as long as or a little longer or a little shorter than second, which nearly equals the last dorsal spine in length; the soft portion pointed in the adult, the rays increasing in length to the third or fourth, which reaches base of caudal. Caudal deeply emarginate, crescentic, with the outer rays much produced and often ending in filaments. Lateral line forming an angle below last dorsal rays. Red, with golden or iridescent markings; three oblique light streaks on each side of the head, proceeding from the eye; soft dorsal, anal, and ventral fins red, reticulate with yellow.

Total length 175 millim.

Mediterranean; Atlantic, from the coast of Portugal to the Gulf of Guinea.

| | | |
|---|---|---|
| *a.* Ad. | Dalmatia. | |
| *b–c.* Hgr. | Adriatic. | |
| *d.* Ad. | Naples. | F. Day, Esq. [P.]. |
| *e.* Yg. | Scilla, Calabria. | Dr. Bovallius [P.]. |
| *f.* Hgr. | Sicily. | W. Swainson, Esq. [P.]. |
| *g–h.* Hgr. | Mediterranean. | |
| *i.* Ad. | Mogador. | C. A. Payton, Esq. [P.]. |
| *k.* Ad. | Madeira. | J. Y. Johnson, Esq. [P.]. |

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| | | |
|---|---|---|
| *l–m.* Yg. | Madeira. | J. Y. Johnson, Esq. [P.]<br>(Types of *A. mundulus*.) |
| *n–r, s.* Ad. | Madeira. | |
| *t.* Ad. | Lanzarote. | Rev. R. T. Lowe [P.]. |
| *u.* Ad., skel. | —— ? | |

### 7. Anthias asperilinguis. (Plate XIII.)

Anthias asperilinguis, *Günth.* i. p. 89 (1859).
Odontanthias asperilinguis, *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 416.

D. X 15. A. III 7. Sc. 40 $\frac{2-3}{16}$; l. l. 37.

A few teeth in the middle of the tongue. Depth of body $2\frac{1}{2}$ times in total length, length of head 3 times. Snout scaly, half as long as eye, with straight profile; diameter of eye $2\frac{2}{3}$ times in length of head, $1\frac{1}{2}$ interorbital width; lower jaw projecting, partly scaly; maxillary scaly, extending to below centre of eye, the width of its distal extremity $\frac{2}{5}$ diameter of eye; serræ at angle of præopercle enlarged, but feeble; three opercular spines. 28 gill-rakers on lower part of anterior arch. Dorsal originating above opercular cleft; first and second spines shortest, rest subequal and much shorter than the soft rays; no notch between spinous and soft portions. Pectoral as long as head. Ventral much produced, the longest ray filamentous and nearly reaching caudal. Anal spines strong, first short, second slightly shorter than third and as long as longest dorsal spines; soft portion rounded, third and fourth rays longest. Caudal crescentic, with the outer rays much produced and ending in filaments. Lateral line forming an angle below last dorsal rays. Red, with golden stripes along the series of scales.

Total length 165 millim.

Atlantic coast of South America.

| | | |
|---|---|---|
| *a.* Ad. | S. America. | Sir R. Schomburgk [P.]. (Type.) |

### 8. Anthias formosus. (Plate XIV.)

Anthias formosus, *Bouleng. Proc. Zool. Soc.* 1889, p. 238.

D. X 14. A. III 7–8. Sc. 40–45 $\frac{2-3}{17-18}$; l. l. 29–31.

Depth of body equal to length of head, $2\frac{1}{2}$ to $2\frac{2}{3}$ in total length. Snout scaly, convex, shorter than diameter of eye, which is $3\frac{1}{2}$ to 4 times in length of head, and slightly exceeds interorbital width; lower jaw projecting, naked; maxillary scaly, extending to below centre of eye or a little beyond, the width of its distal extremity $\frac{3}{5}$ diameter of eye; two or three spines at angle of præopercle; three opercular spines. 28–30 gill-rakers on lower part of anterior arch. Dorsal originating above opercular cleft; first and second spines shortest, third longest, twice or thrice as long as fourth, and produced in a long dermal lobe or filament; no notch between

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spinous and soft portions; soft rays longest anteriorly, third, fourth, and fifth produced into long filaments. Pectoral shorter than head, a little longer than ventral; latter hardly reaching anal. Anal spines strong, first short, third a little longer than second, which nearly equals last dorsal spine; anterior soft rays longest, second produced into a filament. Caudal crescentic, outer rays nearly thrice as long as middle ones. Lateral line forming an angle below the last dorsal rays. Bronzy olive, here and there with blotches of magenta-red; fins, and three wavy stripes on each side, pale rosy; base of dorsal bronzy-olive, like the back.

Total length 170 millim.

Sea of Oman.

| | | | |
|---|---|---|---|
| *a–b.* Ad. | Muscat. | A. S. G. Jayakar, Esq. [P.]. | (Types.) |
| *c–d.* Ad. | Muscat. | A. S. G. Jayakar, Esq. [P.]. | |

### 9. Anthias margaritaceus.

Anthias margaritaceus, *Hilgend. Sitzb. Ges. naturf. Fr.* 1879, p. 78; *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 225, pl. iii. fig. 1.

D. X 17–18. A. III 7–8. Sc. 42–45 $\frac{4}{15}$; l. l. 27–30.

Depth of body $2\frac{1}{2}$ times in total length, length of head $2\frac{4}{5}$ to 3 times. Snout scaly, slightly convex, shorter than diameter of eye, which is 3 to $3\frac{1}{2}$ times in length of head, and equals interorbital width; lower jaw projecting, partly scaled; maxillary scaly, extending to below centre of eye, or slightly beyond, the width of its distal extremity $\frac{3}{5}$ to $\frac{2}{3}$ diameter of eye; two or three strong spines at angle of præopercle; three opercular spines. 23 gill-rakers on lower part of anterior arch. Dorsal originating above post-temporal; first and second spines shortest, third longest in the adult, nearly twice as long as the fourth and ending in a filament; no notch between spinous and soft portions; soft dorsal not deeper than spinous, third ray produced in a long filament. Pectoral nearly as long as head. Ventral as long as or a little shorter than pectoral, reaching anal. Anal spines strong, first shortest, second longest and strongest; anterior soft rays longest. Caudal deeply emarginate, crescentic, with the outer rays much produced and ending in long filaments. Lateral line forming an angle below the last dorsal rays. Red, with two longitudinal series of mother-of-pearl spots on each side, and a streak of the same colour from below the eye to the base of the pectoral; base of dorsal brown or blackish; a black blotch may be present between the last four dorsal spines.

Total length 140 millim.—Reaches to 210 millim.

Japan.

| | | |
|---|---|---|
| *a.* Ad. | Bay of Tokio. | Prof. Döderlein [C.]. (One of the types.) |

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### 10. Anthias japonicus.

Anthias japonicus, *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 227, pl. iii. fig. 2.

D. X 15. A. III 7. Sc. 38 $\frac{2-3}{12}$; l. l. 35.

Depth of body equal to length of head, $2\frac{2}{3}$ to 3 times in total length. Snout scaly, convex, shorter than diameter of eye, which is 3 to $3\frac{1}{2}$ times in length of head, and much greater than interorbital width; lower jaw projecting, scaly; maxillary scaly, extending to below posterior third of eye, the width of its distal extremity $\frac{1}{2}$ diameter of eye; præopercle with rounded, evenly serrated border; three opercular spines. 14 gill-rakers on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the fourth, which is half as long as the head, then decreasing to the last, which is not longer than the second, and much shorter than the soft rays, the second of which is slightly prolonged in a filament. Pectoral as long as head, longer than ventral, which does not reach anal. Anal spines strong, second longest and strongest, at least as long as longest dorsal; soft rays increasing in length to the third. Caudal feebly emarginate, the upper rays produced, filiform. Yellowish red.

Total length 100 millim.—Reaches 130 millim.

Japan.

| | | |
|---|---|---|
| *a*. Ad. | Bay of Tokio. | Prof. Döderlein [C.]. (One of the types.) |

### 11. Anthias cichlops.

Serranus cichlops, *Bleek. Nat. Tijdschr. Nederl. Ind.* iv. 1853, p. 245.
Anthias cichlops, *Günth.* i. pp. 95, 503 (1859).
Pseudanthias cichlops, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1872, p. 166, *and Atlas Ichth.* vii. p. 20, pl. cclxxxix. fig. 1 (1876).

D. X 16. A. III 6. Sc. 45 $\frac{2-3}{13}$.

Depth of body slightly more than 3 times in total length, length of head $3\frac{1}{2}$ times. Snout scaly, shorter than diameter of eye, which is $3\frac{1}{2}$ times in the length of head; lower jaw projecting, scaly; maxillary scaly, extending to below posterior third of eye; serræ of præopercle enlarged at angle, which is rounded; three opercular spines. Dorsal originating above opercular cleft; first and second spines shortest, rest equal; no notch between spinous and soft portions; latter forming a point posteriorly, the membrane between the rays scaly. Pectoral nearly as long as head, as long as ventral; latter reaching anal. Anal spines strong, second and third equal; soft portion pointed, scaly like the dorsal. Caudal truncate or slightly emarginate, with the outer rays much prolonged. Anterior half red, posterior half yellow.

Total length 112 millim.

Sumatra.

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### 12. Anthias squamipinnis.

Serranus (Anthias) squamipinnis, *Peters, Mon. Berl. Ac.* 1855, p. 429.
Anthias cheirospilos, *Bleek. Act. Soc. Sc. Ind. Neerl.* ii. 1857, *Vischf. Amb.* p. 36; *Günth.* i. p. 502 (1859).
Anthias lepidolepis, *Bleek. l. c.* p. 37.
Anthias squamipinnis, *Günth. t. c.* p. 89; *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 706.
Pseudanthias chirospilus, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1872, p. 161, *and Atlas Ichth.* vii. p. 18, pl. cclxxxviii. fig. 1 (1876).
Pseudanthias lepidolepis, *Bleek. ll. cc.* pp. 163, 19, fig. 2.
Anthias (Pseudanthias) squamipinnis, *Klunz. Fische Roth. Meer.* p. 9 (1884); *Sauv. Hist. Madag., Poiss.* p. 133, pl. xvii. fig. 1 (1891).
Anthias (Pseudanthias) gibbosus, *Klunz. l. c.*

D. X 17–18. A. III 7–8. Sc. 40–44 $\frac{2-3}{15-17}$.

Depth of body $2\frac{2}{3}$ to 3 times in total length, length of head $3\frac{1}{2}$ times. Snout scaly, convex, shorter than diameter of eye, which is 3 to $3\frac{1}{2}$ times in length of head; lower jaw projecting, scaly; maxillary scaly, extending to below posterior third of eye; serræ of præopercle slightly enlarged at angle, which is rounded; two opercular spines. Dorsal originating above opercular cleft; first and second spines shortest, third longest and sometimes produced in a long filament; no notch between spinous and soft portions; latter forming an obtuse point in its posterior third, the membrane between the rays scaly. Pectoral as long as or a little shorter than head. Ventral about as long as pectoral, extending to anal. Anal spines strong, first shortest, second and third equal or second slightly longer; soft portion pointed, scaly like the dorsal. Caudal emarginate, the outer rays more or less produced into filaments. Red; a bluish streak from below the eye to the base of the pectoral; fins yellowish red, with a dark network enclosing roundish light spots.

Total length 100 millim.

Indian Ocean (Mozambique, Red Sea, Amboyna).

### 13. Anthias manadensis.

Anthias manadensis, *Bleek. Act. Soc. Sc. Ind. Neerl.* i. no. 6, 1856, p. 39; *Günth.* i. p. 502 (1859).
Pseudanthias manadensis, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1872, p. 165, *and Atlas Ichth.* vii. p. 19, pl. cclxxxviii. fig. 5 (1876).

Agrees in almost every respect with *A. squamipinnis*, but third dorsal spine scarcely longer than fourth, and soft dorsal and anal more rounded. Red above, golden on the sides, with rose-coloured streaks; dorsal, anal, caudal, and ventral fins orange with whitish edge; soft dorsal dotted with yellow.

Total length 106 millim.

Celebes.

### 14. Anthias huchtii.

Anthias huchtii, *Bleek. Act. Soc. Sc. Ind. Neerl.* ii. 1857, *Vischf. Amb.* p. 38.

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Pseudanthias huchtii, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1872, p. 160, *and Atlas Ichth.* vii. p. 17, pl. ccxc. fig. 1 (1876).

D. X 17. A. III 7. Sc. 40 $\frac{3}{16}$; l. l. 37.

Depth of body $2\frac{1}{2}$ times in total length, length of head $3\frac{1}{3}$ to $3\frac{1}{2}$ times. Snout scaly, convex, shorter than diameter of eye, which is 3 to $3\frac{1}{3}$ times in length of head, and slightly less than interorbital width; lower jaw not projecting, scaly; maxillary scaly, extending to below posterior third of eye, the width of its distal extremity $\frac{2}{3}$ diameter of eye; serræ of præopercle slightly enlarged at angle, which is rounded; sub- and interopercle serrated; two opercular spines. 25 gill-rakers on lower part of anterior arch. Dorsal originating above opercular spine; first and second spines shortest, third a little longer than fourth; no notch between spinous and soft portions; base scaly. Pectoral as long as head. Ventral a little shorter than pectoral, not quite reaching anal. Anal spines strong, first shortest, second slightly longer than third; soft portion scaly at the base, pointed, third ray longest. Caudal crescentic, outer rays produced into short filaments. Rosy, more or less brownish on the back, with or without four ill-defined dark cross-bands; a pale streak from eye to base of pectoral.

Total length 70 millim.—Reaches to 90 millim.

Amboyna, Flores.

*a*. Ad. Amboyna. Bleeker Collection. (One of the types.)

### 15. Anthias hypselosoma.

Pseudanthias hypselosoma, *Bleek. Arch. Néerl.* xiii. 1878, p. 58, pl. ii. fig. 2, *and Abh. nat. Ver. Hamb.* vii. 1880, p. 29.

Anthias cichlops (*non Bleek.*), *Douglas-Ogilby, Proc. Zool. Soc.* 1889, p. 151.

D. X 16. A. III 7. Sc. 47–50 $\frac{4}{15-18}$; l. l. 44–46.

Depth of body $2\frac{1}{2}$ times in total length, length of head 3 to $3\frac{1}{4}$ times. Snout scaly, convex, nearly as long as diameter of eye, which is nearly 4 times in length of head, and equal to or slightly less than interorbital width; lower jaw slightly projecting, scaly; maxillary scaly, extending to below centre of eye or a little beyond, the width of its distal extremity nearly $\frac{2}{3}$ diameter of eye; serræ of præopercle enlarged at angle; sub- and interopercle serrated; three opercular spines. 27 gill-rakers on lower part of anterior arch. Dorsal originating above opercular cleft; first and second spines shortest, rest subequal; no notch between spinous and soft portions; base scaly. Pectoral and ventral as long as head, latter reaching anal. Anal spines strong, first short, second as long as or slightly shorter than third. Caudal moderately emarginate. Coloration uniform in spirit, red in front, yellow behind in life; a bluish-white streak from below the eye to the base of the pectoral.

Total length 95 millim.

Western Pacific (Molucca Sea, New Guinea, Lord Howe Island).

*a–b*. Ad. Mysol.

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### 16. Anthias pleurotænia.

Anthias pleurotænia, *Bleek. Act. Soc. Sc. Ind. Neerl.* ii. 1857, *Vischf. Amb.* p. 34; *Günth.* i. p. 502 (1859); *Douglas-Ogilby, Proc. Zool. Soc.* 1889, p. 153.

Pseudanthias pleurotænia, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1872, p. 158, *and Atlas Ichth.* vii. p. 17, pl. cclxxxvii. fig. 1 (1876).

? Anthias (Pseudanthias) tæniatus, *Klunz. Fische Roth. Meer.* p. 9, pl. iii. fig. 2 (1884).

D. X 17. A. III 7. Sc. 48–52 $\frac{4}{18\text{-}20}$.

Depth of body $2\frac{2}{5}$ to 3 times in total length, length of head $3\frac{1}{3}$ to $3\frac{4}{7}$ times. Snout scaly, shorter than eye, the diameter of which is $3\frac{1}{3}$ to $3\frac{3}{4}$ times in length of head; interorbital width equal to or slightly greater than diameter of eye; lower jaw slightly projecting, scaly; maxillary scaly, extending to below centre or posterior third of eye; serræ of præopercle slightly enlarged at angle, which is rounded; three opercular spines. Dorsal originating above opercular cleft; third spine a little longer than the others; no notch between spinous and soft portions; latter obtusely pointed posteriorly. Pectoral nearly as long as head. Third ventral ray produced. Anal spines strong, third a little longer than second; soft portion pointed. Caudal bifid, angularly notched, with pointed lobes. Red or reddish brown, fins yellowish; a curved silvery or pale blue streak from below the eye to the caudal, passing under the pectoral, and a second from behind the pectoral to the caudal; base of dorsal and anal purplish.

Total length 134 millim.

Amboyna and North-east coast of Australia; Red Sea?

The following species is insufficiently described, and its reference to the present genus doubtful:—

ANTHIAS BERYCOIDES, Hilgend. Sitzb. Ges. naturf. Fr. 1879, p. 79.

D. IX 10. A. III 7. Sc. 48–51 $\frac{5}{16}$.

Eye very large, $2\frac{1}{2}$ to 3 times in length of head; præopercle with small irregular serræ; opercle with two spines. Dorsal deeply notched. None of the fin-rays produced. Caudal feebly notched. Yellowish and reddish above, sides silvery; upper surface of head, belly, spinous dorsal, and edge of caudal blackish.

Japan.

## 37. PLECTRANTHIAS.

Plectranthias, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1872, p. 238, *and Arch. Néerl.* xi. 1876, p. 252.

Body strongly compressed; scales large, ciliated, smooth. Lateral line complete, the tube produced into an ascending tubule. Mouth rather large, protractile; maxillary exposed; jaws with villiform teeth and curved canines; a small group of teeth on the vomer and

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a narrow series on each palatine; tongue smooth; head partly scaly; posterior border of præopercle serrated, lower border with two strong antrorse spines; opercle with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers short. A single dorsal fin, with X 16–17 rays, the spinous portion a little longer than the soft. Anal short, with III 7 rays. Caudal truncate. Pectorals obtuse-pointed, subsymmetrical; rays 14–15. Ventrals below pectorals, close together, with a strong spine. Posterior processes of præmaxillaries extending to the frontals, which, however, do not embrace a fossa; parietal and supraoccipital bones very short, with moderate crests, the frontals behind the orbits smooth and convex. Vertebræ 26 (10+16).

Western Tropical Pacific.

### 1. Plectranthias anthioides.

Plectropoma anthioides, *Günth. Proc. Zool. Soc.* 1871, p. 655.
Plectranthias anthioides, *Bleek. Atlas Ichth.* vii. p. 21 (1876).
Anthias megalepis, *Günth. Voy. Challeng., Shore-Fish.* p. 37, pl. xvi. fig. E (1880).

D. X 16–17. A. III 7. Sc. 32–37 $\frac{2-3}{13-15}$; l. l. 28–33.

Depth of body $2\frac{2}{3}$ to 3 times in total length, length of head $2\frac{1}{2}$ to $2\frac{2}{3}$ times. Snout naked, as long as or slightly shorter than the eye, the diameter of which is $3\frac{2}{3}$ to 4 times in length of head; interorbital region scaly, narrow, not half diameter of eye; lower jaw not or but slightly projecting; maxillary naked, extending to below posterior third or posterior border of eye; præopercular border rounded; opercular spines strong. 11 or 12 gill-rakers on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, $\frac{3}{5}$ to $\frac{1}{2}$ length of head, and about as long as soft rays; a deep notch between spinous and soft portions. Pectoral a little shorter than head and much longer than ventral. Anal spines strong, first short, second longest, as long as or a little longer than longest dorsal. Caudal truncate. Lateral line forming an angle on caudal peduncle. Rose-coloured, uniform or with irregular blackish patches on the back.

Total length 100 millim.

Sea of Celebes and Arafura Sea.

| | | |
|---|---|---|
| *a*. Ad. | Manado, Celebes. | Dr. A. B. Meyer [C.]. (Type.) |
| *b–d*. Ad. & hgr. | Kei Ids., 129 faths. | H.M.S. 'Challenger.' (Types of *A. megalepis*.) |
| *e*. Ad., skel. | Kei Ids. | H.M.S. 'Challenger.' |

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## 38. DACTYLANTHIAS.

Dactylanthias, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1872, p. 156, *Arch. Néerl.* xi. 1876, p. 251, *and Atlas Ichthyol.* vii. p. 15 (1876).

Body strongly compressed; scales rather large, smooth, ciliated. Lateral line complete. Mouth rather large, protractile: maxillary exposed; jaws with villiform teeth and a few small canines; narrow bands of teeth on vomer and palatines; tongue smooth; head entirely scaly, including maxillary; præopercle serrated; two opercular spines. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present. A single dorsal fin, scaly between the rays at the base, with X 17 rays, the spinous and soft portions nearly equal in length. Anal short, with III 7 rays. Caudal emarginate. Pectorals subsymmetrical, pointed; rays 18, all simple, not branched. Ventrals below pectorals, close together, with a strong spine.

Sea of Amboyna.

### 1. Dactylanthias haplodactylus.

Dactylanthias aplodactylus, *Bleek. Nederl. Tijdschr. Dierk.* iv. 1871, p. 94, *and Atl. Ichth.* vii. p. 15, pl. cclxxxii. fig. 3 (1873).

D. X 17. A. III 7. Sc. 40 $\frac{2}{16}$.

Depth of body $2\frac{2}{5}$ times in total length, length of head $2\frac{5}{6}$ times. Snout about as long as diameter of eye, which is 3 to $3\frac{1}{3}$ times in length of head; lower jaw not projecting, naked; maxillary extending to below centre of eye; serræ of præopercle slightly enlarged at angle, which is rounded; opercular spines strong. Dorsal originating above opercular cleft; spines strong, first and second shortest, rest subequal and about $\frac{3}{4}$ length of head; soft dorsal pointed, the longest rays $\frac{3}{4}$ length of head; no notch between spinous and soft portions. Pectoral as long as head. Ventral with the second and third rays produced. Anal spines strong, first shortest, second a little longer than third and as long as longest dorsal spines; soft portion pointed, third ray produced. Caudal emarginate, with the outer rays produced. Red, fins yellowish pink; two purplish bars across the posterior part of the body.

Total length 255 millim.

Amboyna.

## 39. CALLANTHIAS.

Callanthias, *Lowe, Proc. Zool. Soc.* 1839, p. 76, *and Fish. Madeira*, p. 13 (1843); *Günth. Cat.* i. p. 87 (1859); *Guichen. Ann. Soc. Linn. Maine-et-Loire*, x. 1868, p. 86; *Bleek. Arch. Néerl.* xi. 1876, p. 253; *Jord. & Eigenm. Bull. U.S. Fish Comm.* vii. 1890, p. 417.

Body strongly compressed; scales moderate or rather large, ciliated, smooth. Lateral line running close to the dorsal fin and lost on the upper surface of the caudal peduncle or under last rays of

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dorsal fin; the tube straight and extending along nearly the entire scale. Mouth moderate, protractile; maxillary exposed; jaws with villiform teeth and canines; a few teeth on vomer and palatines; tongue smooth; head, including maxillary, scaly; præopercle entire; opercle with two spines. Gill-membranes united in front; six branchiostegals; pseudobranchiæ present; gill-rakers very long and slender. A single dorsal fin, with XI 10–11 rays, the spinous portion longer than the soft. Anal short, with III 9–10 rays. Caudal emarginate. Pectorals short, rounded, upper rays longest; rays 20–21. Ventrals below pectorals, close together, with a strong spine and five soft rays. Posterior processes of præmaxillaries very long, meeting the very strong supraoccipital crest, which extends forward to the anterior extremity of

Fig. 23.—Upper view of skul. of *Callanthias peloritanus*.

the frontals; supraoccipital very large, produced far forward between the frontals; parietals extending forward as far as posterior border of orbits, with strong crests which are continued on the frontals to between the orbits. Vertebræ 24 (11+13).

Mediterranean and neighbouring parts of the Atlantic; coast of Tasmania.

This genus differs very considerably from *Anthias* and allies both in its skeleton and in its external features. In my opinion, the difference between *Callanthias* and *Anthias* is as great as between the latter and *Plesiops*. In some respects it may be regarded as intermediate between the two last-named genera.

### 1. Callanthias peloritanus.

? Lepimphis ruber, *Rafin. Caratt. N. Gen. Anim. Sicil.* p. 34, pl. x. fig. 2 (1810).

Bodianus peloritanus, *Cocco, Giorn. Sc. Sicil.* 1829, p. 138.

Anthias buphthalmos, *Bonap. Icon. Faun. Ital., Pesci*, pl. i. fig. 3 (1832).

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Callanthias paradisæus, *Lowe, Proc. Zool. Soc.* 1839, p. 76, *and Fish. Mad.* p. 13, pl. iii. (1843).

Callanthias peloritanus, *Günth.* i. p. 87 (1859); *Steind. Sitzb. Ak. Wien*, lvi. i. 1867, p. 609; *Canestr. Faun. Ital., Pesci*, p. 77 (1874); *Moreau, Poiss. France*, ii. p. 377, fig. (1881); *Doderl. Man. Ittiol. Mediterr.* iv. p. 85 (1889); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 417.

D. XI 10–11. A. III 9–10. Sc. 40–50 $\frac{1}{15}$; l. l. 22–25.

Canine teeth small; vomerine teeth very feeble. Depth of body equal to length of head, $3\frac{1}{3}$ to $3\frac{2}{3}$ times in total length. Snout convex, half diameter of eye, which is $2\frac{1}{2}$ or $2\frac{2}{3}$ times in length of head and a little greater than interorbital width; lower jaw not projecting; maxillary extending to below centre of eye, the width of its distal extremity $\frac{1}{4}$ diameter of eye; opercular spines moderate. 25 gill-rakers on lower part of anterior arch. Dorsal originating above post-temporal, gradually increasing in height posteriorly, the last spine $2\frac{1}{2}$ times as long as the first, and $\frac{2}{5}$ length of head; fourth soft rays longest, $1\frac{1}{4}$ length of head. Pectoral $\frac{3}{4}$ length of head. Ventral a little shorter than head, reaching anus. Anal spines rather feeble, increasing in size from first to third. Caudal crescentic, with the outer rays much produced. Lateral line ending under last dorsal ray. Rose-coloured, sides and fins tinged with yellow.

Total length 170 millim.

Mediterranean; Madeira.

| | | |
|---|---|---|
| *a*. Ad. | Madeira. | Rev. R. T. Lowe [P.]. |
| *b*. Ad. | Nice. | |
| *c*. Skeleton. | Nice. | |

## 2. Callanthias allporti. (Plate XV.)

Callanthias allporti, *Günth. Ann. & Mag. N. H.* (4) xvii. 1876, p. 390.

D. XI 10. A. III 10. Sc. 48–50 $\frac{1}{18\text{–}20}$; l. l. 42–43.

Canine teeth strong; a transverse series of 3 or 5 strong teeth on vomer. Depth of body 3 times in total length, length of head 4 times. Snout convex, about $\frac{2}{3}$ diameter of eye, which is 3 to $3\frac{1}{3}$ times in length of head; interorbital region very convex, its width $\frac{1}{3}$ length of head; lower jaw not projecting; maxillary extending to below centre of eye, the width of its distal extremity $\frac{1}{2}$ diameter of eye; opercular spines strong, close together, lower longest. 26 gill-rakers on lower part of anterior arch. Dorsal originating above post-temporal, gradually increasing in height posteriorly, the last spine 3 to $3\frac{1}{2}$ times as long as the first, and $\frac{4}{5}$ length of head. Pectoral $\frac{3}{4}$ length of head. Ventral nearly as long as head, reaching anus. First anal spine shortest, second a little shorter than third. Caudal feebly emarginate. Lateral line ending on caudal peduncle. Uniform reddish golden.

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Total length 220 millim.
Coast of Tasmania.

*a–b*. Ad. Tasmania. Morton Allport, Esq. [P.]. (Types.)

## 40. PSEUDOPLESIOPS.

Pseudoplesiops, *Bleek. Nat. Tijdschr. Nederl. Ind.* xv. 1858, p. 217; *Günth. Cat.* ii. p. 260 (1860); *Bleek. Verh. Akad. Amst.* xv. no. 5, 1875, p. 30.

Body compressed; scales large, cycloid. Lateral line running close to the dorsal fin and lost under the last rays of the dorsal fin. Mouth moderate, protractile; maxillary exposed; jaws with villiform teeth and canines; vomerine but no palatine teeth; tongue smooth; head scaly; præopercle and opercle entire. Gill-membranes separate; six branchiostegals; pseudobranchiæ present. A single dorsal fin, with XVI 9 rays, the spinous portion longer than the soft. Anal moderately elongate, with I 14 rays, the six anterior soft rays simple. Caudal rounded. Pectorals short, rounded, with 16 rays. Ventrals below pectorals, close together, with a spine and five soft rays.

Malay Archipelago.

This genus appears to combine characters of *Callanthias* and *Plesiops*. Its systematic position is, however, still very doubtful.

### 1. Pseudoplesiops typus.

Pseudoplesiops typus, *Bleek. Nat. Tijdschr. Nederl. Ind.* xv. 1858, p. 217; *Günth.* ii. p. 260 (1860); *Bleek. Verh. Akad. Amst.* xv. no. 5, 1875, p. 30, pl. iii. fig. 1, *and Atlas Ichth.* ix. pl. cccl**xxx**viii. fig. 3 (1877).

D. XVI 9. A. I 14. Sc. 36 $\frac{1}{15}$.

Depth of body equal to length of head, about $3\frac{1}{3}$ times in total length. Snout convex, much shorter than eye, which is about 3 times in length of head; maxillary extending to below centre of eye. Dorsal originating above base of pectoral, the rays increasing in length to near the end of the fin. Pectoral about $\frac{3}{4}$ length of head. Ventral with the two outer soft rays produced, as long as head. Anal $\frac{1}{2}$ length of dorsal. Caudal rounded. Yellowish rosy, without spots.

Total length 460 millim.
Sea of Goram and Amboyna.

## 41. PARAPLESIOPS.

Plesiops, part., *Günth. Cat.* iii. p. 363 (1861).
Ruppelia (*non Wiedem.*), *Casteln. Proc. Zool. Soc. Vict.* ii. 1873, p. 51.
Paraplesiops, *Bleek. Verh. Akad. Amst.* xv. no. 5, 1875, p. 3.

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Body strongly compressed; scales rather large, ciliated and spinulose. Lateral lines two, the upper running close to the dorsal fin and lost on the upper surface of the caudal peduncle or under the last rays of the dorsal fin, the lower along the middle of the side, from below the anterior rays of the soft dorsal to the caudal; the tubes straight and extending along a considerable portion of the scale, forming together a continuous line. Mouth moderate, protractile; maxillary exposed, with supplemental bone; jaws with villiform teeth and more or less enlarged conical teeth; vomer and palatines with bands of villiform teeth; tongue with an elongate

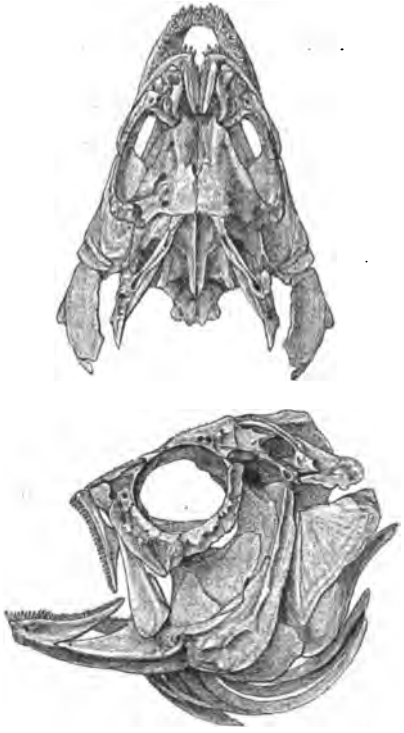

Fig. 24.—Upper and side views of skull of *Paraplesiops meleagris*.

group of teeth; head partially naked; præopercle and opercle entire, without armature. Gill-membranes separate; six branchiostegals; pseudobranchiæ present; gill-rakers moderate. A single dorsal fin, with XI–XII 9–11 rays; the membrane deeply notched between the anterior spines; the spinous portion longer than the soft. Anal short, with III 10–12 rays. Caudal rounded. Pectorals subsymmetrical, rounded, with 18–19 rays. Ventrals below pectorals, close together, with a spine and four soft rays, the first of



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which is much thickened and bifid, the inner formed by the fusion of two. Posterior processes of præmaxillaries nearly reaching the frontal bones; latter very convex behind, bounded posteriorly by a transverse ridge on a line with posterior borders of orbits; parietal and supraoccipital bones with moderately strong crests, extending to the transverse frontal ridge. Vertebræ 26 (10+16).

Western South Pacific and South coast of Australia.

*Synopsis of the Species.*

I. D. XII 9-10; A. III 10.

Ventral spine $\frac{1}{3}$ length of head; sc. 50–58; l. l. $\frac{36-38}{11-15}$ ..... 1. *bleekeri*, p. 338.

Ventral spine not $\frac{1}{3}$ length of head; sc. 56–64; l. l. $\frac{35-41}{15-21}$ ..... 2. *meleagris*, p. 339.

II. D. XI 11; A. III 12 ..... 3. *gigas*, p. 339.

## 1. Paraplesiops bleekeri.

Plesiops bleekeri, *Günth.* iii. p. 364 (1861), *and Fische Südsee*, p. 87, pl. xviii. fig. A (1874); *Macleay, Proc. Linn. Soc. N. S. W.* v. 1880, p. 403; *Vaill. Bull. Soc. Philom.* (8) i. 1889, p. 57.

Ruppelia prolongata, *Casteln. Proc. Zool. Soc. Vict.* ii. 1873, p. 51.

Paraplesiops bleekeri, *Bleek. Verh. Akad. Amst.* xv. no. 5, 1875, p. 8.

D. XII 9-10. A. III 10. Sc. 50–58 $\frac{1}{16-20}$; l. l. $\frac{36-38}{11-15}$.

Depth of body nearly equal to length of head, which is 3 times in total length. Snout convex, $\frac{2}{3}$ to $\frac{4}{5}$ diameter of eye, which is 3 to $3\frac{1}{2}$ times in length of head; interorbital width $3\frac{1}{2}$ to 4 times in length of head; jaws equal; maxillary extending to below posterior third of eye, the width of its distal extremity $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; cheeks and opercles with cycloid scales. 13 gill-rakers on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the last, which is $\frac{1}{2}$ to $\frac{3}{5}$ length of head; soft rays long, sixth or seventh longer than head. Pectoral as long as head. Ventral longer, reaching origin of soft anal; spine $\frac{2}{3}$ length of head. Third anal spine longest, $\frac{1}{2}$ to $\frac{3}{5}$ length of head; soft rays long, some of them produced like the dorsals. Caudal rounded, a little longer than head. Orange, with four broad vertical purplish-black bars; head with some blue spots; pectorals yellow, other fins purple, at least in their distal portion; blue spots at the base of the dorsal and anal.

Total length 325 millim.

East coast of Australia.

| | | | |
|---|---|---|---|
| *a*. Hgr. | Port Jackson. | Australian Museum [E.]. |
| *b*. Ad. | Port Hacking. | Imperial Institute [P.]. |
| *c*. Ad. | Coast of N. S. Wales. | G. Krefft, Esq. [P.]. |
| *d*. Hgr. | —— ? | Haslar Collection. (Type.) |

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### 2. Paraplesiops meleagris.

Plesiops meleagris, *Peters, Mon. Berl. Ac.* 1869, p. 708.

D. XII 10. A. III 10. Sc. 56–64 $\frac{1}{21}$; l. l. $\frac{35-41}{15-21}$.

Depth of body $2\frac{3}{4}$ to 3 times in total length, length of head $3\frac{1}{5}$ to $3\frac{1}{3}$ times. Snout convex, $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye, which is 3 times in length of head; interorbital width 3 to $3\frac{1}{2}$ times in length of head; jaws equal; maxillary extending to below posterior third of eye, the width of its distal extremity $\frac{1}{2}$ diameter of eye; cheeks and opercles with cycloid scales. 12 to 14 gill-rakers on lower part of anterior arch. Dorsal originating above base of pectoral; spines increasing in length to the last, which is nearly $\frac{1}{2}$ length of head; soft rays very long, the longest twice as long as head. Pectoral as long as head. Ventral longer, reaching origin of soft anal; spine about $\frac{1}{2}$ length of head. Third anal spine longest, not quite $\frac{1}{2}$ length of head; soft rays long, like dorsals. Caudal rounded, a little longer than head. Dark purplish brown or blackish, dotted all over with blue; pectorals blackish.

Total length 310 millim.

Coast of South Australia.

| | |
|---|---|
| *a–b*. Ad. | Adelaide. |
| *c*. Ad., skeleton. | Adelaide. |

### 3. Paraplesiops gigas.

Plesiops gigas, *Steind. Anz. Ak. Wien*, 1883, p. 196, *and Sitzb. Ak. Wien*, lxxxviii. i. 1884, p. 1089.

D. XI 11. A. III 12. Sc. 43; l. l. $\frac{36}{21}$.

Depth of body somewhat more than twice in total length, length of head not quite 3 times. Snout convex, a little shorter than diameter of eye, which is nearly 4 times in length of head; interorbital width $3\frac{1}{2}$ times in length of head; maxillary extending a little beyond vertical of posterior border of eye; præopercle with a narrow band of small scales; opercle with three rows of scales. Dorsal spines increasing in length to the last, which is about $\frac{1}{2}$ length of head; longest (6th) soft ray $1\frac{1}{2}$ as long as head. Pectoral slightly shorter than head. Ventral a little longer, its spine about $\frac{1}{2}$ length of head. Third anal spine longest, not quite $\frac{1}{2}$ length of head; soft rays long, like dorsals. Brownish golden, dotted with blue; pectorals pale; the other fins dark purplish blue dotted with pale blue.

Total length 255 millim.

Gulf of St. Vincent, S. Australia.

## 42. PLESIOPS.

Plesiops, *Cuv. Règne Anim.* ii. p. 266 (1817); *Müll. & Trosch. Hor. Ichthyol.* iii. p. 22 (1849); *Bleek. Verh. Akad. Amst.* xv. no. 5, 1875, p. 26.

Pharopteryx, *Rüpp. Atlas, Fische Roth. Meer.* p. 15 (1828).

Plesiops, part., *Günth. Cat.* iii. p. 363 (1861).



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Body strongly compressed; scales large, ciliated and spinulose *. Lateral lines two—the upper running close to the base of the dorsal fin and lost on the upper surface of the caudal peduncle or under the last soft rays, the lower along the middle of the side, from below the posterior spines or the anterior soft rays of the dorsal to the caudal; the tubes straight and extending along a considerable portion of the scale, forming together a continuous line. Mouth moderate, protractile; maxillary exposed, with supplemental bone; jaws with villiform teeth and slightly enlarged conical teeth; vomer and palatines with bands of villiform teeth; tongue toothless: head partially naked; præopercle and opercle entire, without armature. Gill-membranes separate; six branchiostegals; pseudobranchiæ present; gill-rakers short. A single dorsal fin, with XI–XII 6–7 rays, the membrane deeply notched between the spines, the spinous portion thrice as long as the soft. Anal short, with III 8–9 rays. Caudal rounded. Pectorals short, rounded, upper rays longest; rays 20–21. Ventrals below pectorals, close together, with a spine and four soft rays, the first of which is much thickened and bifid. Posterior processes of præmaxillaries long, extending to the frontal bones, which embrace a fossa in front; parietal and supraoccipital bones short, not extending to between postfrontal processes; no parietal crests; supraoccipital crest weak, not produced to the anterior extremity of the bone. Vertebræ 25 (10+15).

Indian and Western South Pacific Oceans.

### 1. Plesiops nigricans.

Pharopteryx nigricans, *Rüpp. Atlas, Fische Roth. Meer.* p. 15, pl. iv. fig. 2 (1828).

Plesiops nigricans, *Rüpp. N. Wirbelth. Abyss., Fische*, p. 5 (1835); *Günth.* iii. p. 363 (1861); *Klunz. Verh. zool.-bot. Ges. Wien*, xxi. 1871, p. 517; *Day, Fish. Ind.* p. 128, pl. xxxi. fig. 5 (1875); *Bleek. Verh. Akad. Amst.* xv. no. 5, 1875, p. 27, pl. iii. fig. 3, *and Atlas Ichthyol.* ix. pl. cccxc. fig. 3 (1877); *Klunz. Fische Roth. Meer.* p. 66 (1884); *Vaill. Bull. Soc. Philom.* (8) i. 1889, p. 58; *Day, Faun. Ind., Fish.* ii. p. 79, fig. (1889).

Plesiops cæruleolineatus, *Rüpp. N. Wirbelth.* p. 5; *Bleek. Nat. Tijdschr. Nederl. Ind.* iv. 1853, p. 116; *Günth. t. c.* p. 363.

Plesiops melas, *Bleek. Verh. Bat. Gen.* xxii. 1849, *Bali*, p. 9.

Plesiops corallicola, *Bleek. Nat. Tijdschr. Nederl. Ind.* iv. 1853, p. 280; *Günth. t. c.* p. 364; *Kner, Novara, Fische*, p. 214 (1865); *Günth. Fische Südsee*, p. 87, pl. lviii. fig. B (1874); *Vaill. l. c.*

D. XI–XII 6–7. A. III 6–7. Sc. 27–30 $\frac{2}{10-11}$; l. l. $\frac{17-19}{14-16}$.

Depth of body equal to length of head, 3 to 3¼ times in total

* I have not been able to satisfy myself of the validity of the character pointed out by Vaillant for distinguishing *P. nigricans* from *P. corallicola*, as the material before me show it to be not even constant on the same individual. Prof. Vaillant was probably deceived by examining isolated detached scales of the two supposed species.

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length. Snout convex, $\frac{2}{3}$ diameter of eye, which is $3\frac{1}{2}$ to 4 times in length of head; interorbital width $5\frac{1}{2}$ to 7 times in length of head; jaws equal; maxillary reaching beyond vertical of posterior border of eye, the width of its distal extremity $\frac{3}{5}$ to $\frac{2}{3}$ diameter of eye; cheeks and opercles with cycloid scales. 6 to 10 gill-rakers (and some rudiments) on lower part of anterior arch. Dorsal originating above extremity of opercle; spines increasing in length to the last, which is nearly $\frac{1}{2}$ length of head, $\frac{1}{2}$ length of longest soft rays; soft dorsal pointed behind. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral longer, reaching origin of soft anal; spine not $\frac{1}{2}$ length of head. Third anal spine longest, $\frac{2}{5}$ length of head; soft rays long, the fin pointed, like the dorsal. Caudal rounded, nearly as long as head. Brown or blackish, uniform or each scale with a blue spot; a more or less distinct blue or black, light-edged ocellus on the opercle; fins dark.

Total length 135 millim.

Indian and Pacific Oceans, from the Red Sea and the East coast of Africa to the coasts of China and Polynesia.

| | | |
|---|---|---|
| *a–b.* Hgr. | Zanzibar. | |
| *c–e.* Hgr. & yg. | Ceylon. | Dr. Ondaatje [P.]. |
| *f.* Ad. | China. | Sir J. Richardson [P.]. |
| *g.* Hgr. | Port Blair, Andamans. | F. Day, Esq. [P.]. |
| *h.* Ad. | Sumatra. | |
| *i.* Ad. | Manado, Celebes. | Dr. A. B. Meyer [C.]. |
| *k–l.* Ad. & yg. | Amboyna. | |
| *m.* Hgr. | Australia. | J. Macgillivray, Esq. [P.]. |
| *n–o.* Ad. & yg. | E. coast of Australia (?). | G. Krefft, Esq. [P.]. |
| *p–r.* Ad. & yg. | Fiji Ids. | H.M.S. 'Herald.' |
| *s.* Hgr. | Levuka, Fiji. | H.M.S. 'Challenger.' |
| *t–u.* Yg. | Friendly or Tonga Ids. | Haslar Collection. |
| *v–w.* Hgr. | Samoa. | Rev. S. J. Whitmee [C.]. |
| *x.* Ad. | Savaii. | Rev. S. J. Whitmee [C.]. |
| *y–z.* Ad. | Micronesia. | |
| *a.* Ad., skel. | —— ? | |

## 2. Plesiops oxycephalus.

Plesiops oxycephalus, *Bleek. Nat. Tijdschr. Nederl. Ind.* viii. 1855, p. 320; *Günth.* iii. p. 364 (1861); *Bleek. Verh. Akad. Amst.* xv. no. 5, 1875, p. 29, pl. ii. fig. 1, *and Atlas Ichthyol.* ix. pl. cccIxxxix. fig. 7 (1877).

D. XII 7. A. III 8.

Closely allied to the preceding, but head pointed, with straight upper profile, and depth of body only $3\frac{3}{5}$ to $3\frac{3}{4}$ times in total length. Caudal with a crescentic orange band; no opercular ocellus.

Total length 97 millim.

Sea of Batu and Amboyna.

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## 43. TRACHINOPS.

Trachinops, *Günth. Cat.* iii. p. 366 (1861); *Kner, Novara, Fische*, p. 215 (1865); *Bleek. Verh. Akad. Amst.* xv. no. 5, 1875, p. 3.

Body elongate and compressed; scales moderate, ciliated, smooth. Lateral lines two, the upper running close to the dorsal fin, and terminating under the last soft rays, the lower along each side of the tail; the tubes straight and extending along a considerable portion of the scale, forming together a continuous line. Mouth moderate, protractile; maxillary exposed; jaws with villiform teeth and canines; a few teeth on vomer and palatines; tongue smooth; head partially naked; præopercle and opercle entire, without armature. Gill-membranes united in front; six branchiostegals; pseudobranchiæ present; gill-rakers long and slender. A single dorsal fin, with XIV 15–17 rays, the spinous portion scarcely longer than the soft. Anal elongate, with III 16–20 rays. Caudal pointed. Pectorals short, rounded, with 17 rays. Ventrals below pectorals, close together, with a spine and four soft rays.

East and South coasts of Australia.

### 1. Trachinops tæniatus.

Trachinops tæniatus, *Günth.* iii. p. 366 (1861); *Kner, Novara, Fische*, p. 215, pl. viii. fig. 7 (1865).

D. XIV 15–16. A. III 20. Sc. 68–70 $\frac{1}{18}$; l. l. $\frac{52-57}{5-14}$.

Canine teeth strong. Depth of body $4\frac{2}{3}$ to $5\frac{1}{3}$ times in total length, length of head $4\frac{1}{2}$ to $4\frac{2}{3}$ times. Snout convex, $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye, which is 3 to $3\frac{1}{2}$ times in length of head and equals interorbital width; jaws equal; maxillary extending to below posterior third of eye, the width of its distal extremity nearly $\frac{1}{2}$ diameter of eye; cheeks and opercles with cycloid scales. Dorsal originating above axilla; spines gradually increasing in length to the last, which is about $\frac{1}{3}$ length of head, and shorter than posterior soft rays. Pectoral $\frac{3}{4}$ length of head. Ventral $\frac{2}{3}$ length of head. Anal rays increasing in length posteriorly. Middle caudal rays prolonged, filamentous. Brown, with a blackish lateral stripe from the pectoral to the extremity of the caudal; a whitish stripe from above the eye along each side of the base of the dorsal fin.

Total length 85 millim.

Coast of New South Wales.

| | | | |
|---|---|---|---|
| *a-b.* Hgr. | N. S. Wales. | J. B. Bennett, Esq. [P.]. | (Types.) |
| *c.* Ad. | Australia. | | |
| *d.* Ad. | Australia. | | |

### 2. Trachinops caudomaculatus.

Trachinops caudimaculatus, *McCoy, Prodr. Zool. Vict.*, Dec. xx. pl. cxciv. (1890).

D. XIV 17. A. III 16. Sc. circa 60; l. l. $\frac{45}{12}$.

Closely allied to the preceding, but canine teeth apparently less

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developed, and middle caudal rays less produced. Back dark brown, becoming lighter and purplish on the sides; caudal and soft dorsal bright yellow; a large blackish blotch at base of caudal, continued on the middle rays.

Total length 70 millim.

Coast of Victoria.

## Subfam. 2. GRAMMISTINÆ.

Maxillary exposed, its upper border not entirely slipping under the præorbital. Scales very small, more or less imbedded in the skin; no scaly process at base of ventral. Anal spines three, if developed. Opercular membrane attached to posterior process of clavicle. Pseudobranchiæ present, well developed.

Fig. 25. —Upper and side views of skull of *Grammistes sexlineatus*.

This small and perfectly natural group, although very nearly related to the preceding, and particularly to *Epinephelus* and *Cromileptes*, is nevertheless definable, and its recognition appears convenient in a family the genera of which are so numerous. The vertebræ have the same structure as in *Epinephelus*, and the supplemental maxillary bone is also present.

Indian, Pacific, and Atlantic Oceans.

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*Synopsis of the Genera.*

| | |
|---|---|
| Dorsal with 7 or 8 spines; anal spines well developed; chin with a large dermal appendage | 44. POGONOPERCA, p. 344. |
| Dorsal with 6 or 7 spines; no distinct anal spines; chin with a rudimentary dermal appendage | 45. GRAMMISTES, p. 345. |
| Dorsal with 2 to 4 spines; no anal spines; no mental appendage | 46. RHYPTICUS, p. 347. |

## 44. POGONOPERCA.

Pogonoperca, *Günth. Cat.* i. p. 169 (1859).
Grammistes, part., *Bleek. Atl. Ichth.* vii. p. 69 (1876), *and Arch. Néerl.* xi. 1876, p. 258.

Body compressed, covered with very small cycloid scales imbedded in the skin. Lateral line complete, the tube straight. Mouth large, protractile; maxillary exposed, with supplemental bone; bands of villiform teeth in jaws and on vomer and palatines; tongue smooth; head entirely covered with minute scales; præopercle with several spines on its posterior border; opercle with three strong spines; chin with a large, fringed, dermal appendage. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-rakers short. Dorsal with VII–VIII 12–13 rays, the spinous portion longer than the soft, with which it is connected at the base. Anal short, with III 8 rays; the spines short but strong. Caudal rounded. Pectorals subsymmetrical, rounded, with 16 or 17 rays. Ventrals slightly in advance of pectorals, close together, with a strong spine.

Indian and Western Tropical Pacific Oceans.

### 1. Pogonoperca punctata.

Grammistes punctatus, *Cuv. & Val.* vi. p. 504 (1830); *Bleek. Act. Soc. Sc. Ind. Neerl.* ii. 1857, *Vischf. Amboina*, p. 31; *Günth.* i. p. 171 (1859); *Bleek. Nederl. Tijdschr. Dierk.* iv. 1873, p. 108; *Günth. Fische Südsee*, p. 11, pl. xi. fig. B (1873); *Bleek. in Pollen, Faun. Madag.* iv. p. 24, pl. xiii. (1874), *and Atl. Ichth.* vii. p. 69, pl. cccxxxvii. fig. 4 (1876).

D. VII–VIII 12–13. A. III 8. L. l. 60–65.

Depth of body $2\frac{1}{4}$ to $2\frac{1}{3}$ times in total length, length of head $2\frac{4}{5}$ to 3 times. Snout as long as diameter of eye, which is $4\frac{1}{2}$ times in length of head; interorbital width 6 to 7 times in length of head; lower jaw strongly projecting, the dermal appendage as long as the eye; maxillary extending to below posterior border of eye, the width of its distal extremity $\frac{2}{3}$ to $\frac{3}{4}$ diameter of eye; præopercle with three to five spines; opercle with three strong, nearly equidistant spines. 8 or 9 gill-rakers (and some rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral; the anterior spines as long as or a little shorter than longest soft

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rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head, as long as or a little longer than ventral. Caudal rounded. Brown, with more or less numerous bluish-white dots, and five large transverse blackish blotches, the first between the eyes, the second on the nape, the third across the spinous dorsal, the fourth at the base of the anterior half of the soft dorsal, and the fifth just behind the soft dorsal; with the exception of the spinous dorsal, the bluish-white dots are confined to the base of the fins, which are uniform yellowish.

Total length 230 millim.

Malay Archipelago and Polynesia.

*a–b.* Ad. Mysol.

### 2. Pogonoperca ocellata.

? Grammistes compressus, *Liénard, Proc. Zool. Soc.* 1833, p. 117.
Pogonoperca ocellata, *Günth.* i. p. 169 (1859); *Playf. Proc. Zool. Soc.* 1867, p. 848.
Pogonoperca punctata (*non C. & V.*), *Günth. t. c.* p. 504.
Grammistes ocellatus, *Günth. Fische Südsee*, p. 11, pl. xi. fig. A (1873); *Bleek. in Pollen, Faune Madag., Poiss.* p. 23, pl. xiv. (1874).
Grammistes punctatus, *Day, Faun. Ind., Suppl.* p. 782 (1888), *and Faun. Ind., Fish.* i. p. 461 (1869).

Very closely allied to the preceding, but body more elongate, the depth being contained $2\frac{1}{2}$ to $2\frac{3}{4}$ times in the total length, the length of the head 3 to $3\frac{1}{2}$ times. The white dots are more numerous on the body, and entirely cover the fins, where they are separated by a dark brown network.

Total length 330 millim.

Indian Ocean.

| | | | |
|---|---|---|---|
| *a.* | Ad., skin. | Mauritius. | (Type.) |
| *b.* | Ad. | Seychelles. | Sir Lambert Playfair [P.]. |
| *c.* | Ad., stffd. | Madras. | Secretary of State for India [P.]. |

## 45. GRAMMISTES.

Grammistes, *Artedi, in Seba, Thes.* iii. p. 75 (1758); *Cuv. & Val.* ii. p. 201 (1828); *Günth. Cat.* i. p. 171 (1859).
Grammistes, part., *Bleek. Atl. Ichth.* vii. p. 69 (1876), *and Arch. Néerl.* xi. 1876, p. 258.

Body compressed, covered with very small, cycloid, obtusely keeled scales enveloped in the slimy coating of the epidermis. Lateral line complete, the tube straight. Mouth large, protractile; maxillary exposed, with supplemental bone; bands of villiform teeth in jaws and on vomer and palatines; tongue smooth; head partly naked, scaly on the sides; præopercle with two or three spines on its posterior border; opercle with three strong spines; chin with a rudimentary dermal appendage. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present; gill-

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rakers short. Dorsal with VI–VII 13–15 rays, the spinous portion as long as or a little shorter than the soft, with which it is connected at the base. Anal short, without distinct spines, with 10–11 rays. Caudal rounded. Pectorals subsymmetrical, rounded, with 17 rays. Ventrals slightly in advance of pectorals, close together, with a short spine. Præmaxillary processes extending to the frontal bones, which embrace a fossa in front; parietal and supra-occipital bones rather short, with feeble crests which do not extend on the frontals: latter bones much thickened and pitted posteriorly. Vertebræ 24 (11 + 13).

Indian and Tropical Pacific Oceans.

### 1. Grammistes sexlineatus.

*Seba, Thes.* iii. pl. xxvii. fig. 5 (1758).
Perca sexlineata, *Thunb. Vetensk. Ac. Handl. Stockh.* xiii. 1792, p. 142, pl. v.
Grammistes orientalis, *Bl. Schn. Syst.* p. 188 (1801); *Cuv. & Val.* ii. p. 203, pl. xxvii. (1828); *Bleek. Nat. Tijdschr. Nederl. Ind.* iv. 1853, p. 105; *Günth.* i. p. 171 (1859); *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 707; *Günth. Fische Südsee*, p. 10 (1873); *Day, Fish. Ind.* p. 28, pl. ix. fig. 1 (1875); *Bleek. Atl. Ichth.* vii. p. 70, pl. cccxxxvii. fig. 5 (1876); *Day, Faun. Ind., Fish.* i. p. 460, fig. (1889).
Bodianus sexlineatus, *Lacép. Poiss.* iv. pp. 285 & 302 (1802).
Sciæna vittata, *Lacép. t. c.* pp. 310 & 316.
Perca triacantha, *Lacép. t. c.* pp. 398 & 424.
Perca pentacantha, *Lacép. l. c.*
Centropomus sexlineatus, *Lacép. op. cit.* v. p. 689 (1803).
Grammistes sexlineatus, *Klunz. Fische Roth. Meer.* p. 10 (1884).

D. VI–VII 13–15. A. 10–11. L. l. 63–70.

Depth of body 2½ to 2⅔ times in total length; length of head 2¾ to 3 times. Snout as long as diameter of eye, which is 4½ times in length of head and equals interorbital width; lower jaw projecting, with a more or less distinct rudimentary dermal appendage on the chin; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity about ¾ diameter of eye; præopercle with two or three spines; opercle with three strong, nearly equidistant spines. 7 or 8 gill-rakers (and some rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral; anterior spines as long as or a little shorter than longest soft rays. Pectoral ⅔ length of head, longer than ventral. Caudal rounded. Dark brown, with three to nine white longitudinal streaks, which do not extend on the fins.

Total length 200 millim.

Indian and Western Tropical Pacific Oceans.

| | | |
|---|---|---|
| *a*. Ad., skin. | Zanzibar. | Sir Lambert Playfair [C.] |
| *b*. Ad. | Mauritius. | Zoological Society. |
| *c*. Ad., stffd. | Mauritius. | |
| *d*. Hgr. | Ceylon. | H. Nevill, Esq. [P.]. |

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| | | |
|---|---|---|
| *e.* Hgr. | Formosa. | R. Swinhoe, Esq. [C.]. |
| *f.* Hgr. | Philippines. | |
| *g.* Yg., skin. | Sumatra. | Mungo Park [C.]. |
| *h.* Hgr. | Amboyna. | |
| *i.* Hgr. | Mysol. | |
| *k.* Yg. | Australia. | J. Macgillivray, Esq. [P.]. |
| *l.* Hgr. | Solomon Ids. | |
| *m.* Hgr., skin. | Aneiteum, New Hebrides. | J. Macgillivray, Esq. [P.]. |
| *n.* Skeleton. | Solomon Ids. | |

## 46. RHYPTICUS.

Rypticus, *Cuv. Règne Anim.* 2nd ed. ii. p. 144 (1829); *Cuv. & Val.* iii. p. 60 (1829); *Günth. Cat.* i. p. 171 (1859); *Bleek. Arch. Néerl.* xi. 1876, p. 258; *Jord. & Gilb. Syn. Fish. N. Am.* p. 543 (1882); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 336.
Smecticus, *Val. Voy. Vénus, Zool.* p. 305 (1855); *Bleek. l.c.*
Promicropterus, *Gill, Proc. Ac. Philad.* 1861, p. 53.
Eleutheractis, *Cope, Tr. Amer. Philos. Soc.* xiv. 1870, p. 467.

Body strongly compressed, covered with very small cycloid scales imbedded in the skin. Lateral line complete, the tube straight. Mouth large, protractile; maxillary exposed, with supplemental bone; bands of villiform teeth in jaws and on vomer and palatines; tongue smooth; head covered with minute, imbedded scales; præopercle and opercle each with two or three strong spines. Gill-membranes somewhat connected in front; seven branchiostegals; pseudobranchiæ present; gill-rakers short. Dorsal extending along the greater part of the back, with II–IV 23–26 rays, the spines short but strong and more or less completely connected by membrane with the soft portion of the fin. Anal shorter, without spines, with 16–17 rays. Caudal rounded. Pectorals subsymmetrical, rounded, with 17 rays. Ventrals small, slightly in advance of pectorals, close together, with a short, moderately strong spine. All the fins thickly covered with minute scales. Præmaxillary processes extending to frontal bones, which embrace a fossa in front; parietal and supraoccipital bones short, with feeble crests, which do not extend on the frontals. Vertebræ 24 (10+14).

Tropical and Subtropical Atlantic Ocean; Eastern Tropical Pacific Ocean.

### *Synopsis of the Species.*

I. Dorsal with three (or four) spines.

| | |
|---|---|
| Snout at least as long as the eye; l.l. 85–90.... | 1. *saponaceus*, p. 348. |
| Snout shorter than the eye; l.l. 67 ..... | 2. *arenatus*, p. 349. |

II. Dorsal with two spines.

| | |
|---|---|
| Depth of body at least three times in total length. | 3. *nigripinnis*, p. 349. |
| Depth of body not three times in total length .. | 4. *bistrispineus*, p. 350. |

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### 1. Rhypticus saponaceus.

*Parra, Descr. Piez. Hist. Nat. Cuba*, p. 51, pl. xxiv. fig. 2 (1787).
Anthias saponaceus, *Bl. Schn. Syst.* p. 310 (1801).
Rypticus saponaceus, *Cuv. & Val.* iii. p. 63 (1829); *Günth.* i. p. 172 (1859); *Peters, Mon. Berl. Ac.* 1876, p. 245; *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 35; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 340.
Rhypticus microps, *Casteln. Anim. Nouv. Amér. Sud*, p. 6 (1855).
Rhypticus arenatus (*non C. & V.*), *Steind. Sitzb. Ak. Wien*, lvi. i. 1867, p. 347.
Eleutheractis coriaceus, *Cope, Tr. Amer. Philos. Soc.* xiv. 1870, p. 467, fig.
Rypticus coriaceus, *Jord. & Eigenm. l. c.* p. 341.

D. III 23–25. A. 16–17. L. l. 85–90.

Depth of body $2\frac{2}{5}$ to 3 times in total length in the adult, $3\frac{2}{5}$ times in the young; head 3 to $3\frac{1}{3}$ times in total length. Snout longer than diameter of the eye (equal to eye in young), which is $4\frac{1}{2}$ (young) to 6 times in length of head; interorbital space $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; lower jaw strongly projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity at least $\frac{2}{3}$ diameter of eye; præopercle with two or three spines; opercle with three strong spines, median nearer upper than lower, which may be obsolete. 7 or 8 gill-rakers (and some rudiments) on lower part of anterior arch. Dorsal with short but strong spines, soft portion elevated and rounded behind. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Ventral $\frac{2}{3}$ to $\frac{1}{2}$ length of head. Anal $\frac{1}{3}$ to $\frac{1}{2}$ length of dorsal. Caudal rounded. Dark brown or purplish, with or without more or less distinct lighter spots or marblings; fins darker.

Total length 270 millim.

Tropical and Subtropical Atlantic.

| | | |
|---|---|---|
| *a–c.* Ad., hgr., & yg. | Bermuda. | J. M. Jones, Esq. [P.]. |
| *d, e, f, g.* Ad. & hgr., skins. | Jamaica. | Parnell Collection. |
| *h, i.* Ad. | St. Croix. | |
| *k, l.* Hgr., skins. | Trinidad. | Sir J. Richardson [P.]. |
| *m–n.* Ad. & hgr. | Bahia. | Dr. O. Wucherer [C.]. |
| *o–p.* Ad. | St. Helena. | J. C. Melliss, Esq. [P.]. |
| *q.* Ad. | St. Vincent, Cape Verd. | J. Macgillivray, Esq. [C.]. |
| *r–s.* Hgr. | Cape Verd Islands. | Rev. R. T. Lowe [P.]. |
| *t.* Ad., stffd. | Cape of Good Hope. | Sir A. Smith [P.]. |
| *u.* Ad., skel. | —— ? | |

The following must be considered on present evidence, as very doubtfully entitled to specific rank:—

Smecticus bicolor, *Val. Voy. Vénus, Zool.* p. 307, pl. ii. fig. 2 (1855).
Rhypticus bicolor, *Günth.* i. p. 173 (1859); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 339.

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? Rhypticus xanti, *Gill, Proc. Ac. Philad.* 1862, p. 250; *Jord. & Eigenm. l. c.*

These supposed species, founded on specimens with three dorsal spines from the Pacific coast of Tropical America, may prove to be undistiguishable from their Atlantic congener. At least the characters which have hitherto been given for distinguishing them appear to me insufficient. But not having seen any specimens, I must reserve my opinion on the question.

## 2. Rhypticus arenatus.

Rypticus arenatus, *Cuv. & Val.* iii. p. 65, pl. xlv. (1829); *Günth.* i. p. 173 (1859); *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 340.
? Rhypticus subbifrenatus, *Gill, Proc. Ac. Philad.* 1861, p. 53.
? Rhypticus nigromaculatus, *Steind. Sitzb. Ak. Wien,* lvi. i. 1867, p. 348; *Jord. & Eigenm. l. c.* p. 341.

This fish, which is only known from young specimens, differs from the young *R. saponaceus* in the larger eye, which exceeds the length of the snout and is less than ¼ the length of the head, and the smaller number of tubes in the lateral line (67 instead of 85–90). Grey or pale brown, with blackish dots or small round spots; fins pale.

Total length 65 millim.

Tropical Atlantic (West Indies and Brazil).

| | | |
|---|---|---|
| *a.* Yg. | Bahia. | H.M.S. 'Challenger. |

## 3. Rhypticus nigripinnis.

Rhypticus nigripinnis, *Gill, Proc. Ac. Philad.* 1861, p. 53; *Jord. & Gill, Proc. U.S. Nat. Mus.* v. 1882, p. 359; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 339.
Rhypticus maculatus (*non Holbr.*), *Gill, Proc. Ac. Philad.* 1862, p. 251.
Promicropterus decoratus, *Gill, Proc. Ac. Philad.* 1863, p. 164.
Rhypticus decoratus, *Günth. Tr. Zool. Soc.* vi. 1868, p. 412.

Very closely allied to *R. saponaceus*, but dorsal II 24–26. Depth of body 3 to 4 times in total length; length of head 3 to 3½ times. L. l. 80–85. Dark brown, with yellow or pale brown roundish spots; fins darker.

Total length 280 millim.

Pacific coast of Tropical America, from Cape San Lucas to Panama.

| | | |
|---|---|---|
| *a.* Ad. | Las Peñas, Jalisco. | Dr. A. C. Buller [C.]. |
| *b–c, d.* Ad. & yg. | Panama. | Capt. J. C. Dow [P.]. |
| *e–f.* Yg. | Panama. | O. Salvin, Esq. [C.]. |

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### 4. Rhypticus bistrispineus.

Bodianus bistrispinus, *Mitchill, Amer. Monthly Mag.* 1818, p. 247.
Rhypticus maculatus, *Holbr. Ichth. S. Carol.* p. 39 (1856), *and 2nd ed.* p. 42, pl. vi. fig. 2 (1860); *Günth.* i. p. 173 (1859); *Jord. & Gilb. Syn. Fish. N. Am.* p. 543 (1882); *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 35.
Promicropterus maculatus, *Gill, Proc. Ac. Philad.* 1861, p. 53.
Promicropterus decoratus (*non Gill*), *Cope, Proc. Ac. Philad.* 1870, p. 118.
Rhypticus pituitosus, *Goode & Bean, Proc. U.S. Nat. Mus.* ii. 1879, p. 341; *Jord. & Gilb. l. c.*
Rhypticus decoratus, *Jord. & Gilb. l. c.*
Rhypticus bistrispinus, *Jord. Proc. U.S. Nat. Mus.* vii. 1884, p. 149; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 338.

The only constant difference by which this species can be distinguished from its Pacific congener with two dorsal spines appears, according to Jordan and Eigenmann's description, to be the deeper body, which is but $2\frac{1}{3}$ to $2\frac{2}{4}$ times in the total length *.

South Atlantic coast of United States.

## Subfam. 3. PRIACANTHINÆ.

Maxillary exposed, not entirely slipping under the very narrow præorbital; the cleft of the mouth nearly vertical. Postorbital portion of the head much abbreviated. Scales very thin, with a more or less developed sclerous plate on its posterior border. No scaly process at base of ventral. Anal fin with three spines. Pseudobranchiæ very large, extending along the whole length of the opercle.

The vertebræ are fewer than in any of the other *Serranidæ*: 9 or 10 præcaudal and 13 caudal. The first vertebra, if present, is very small, with a very short centrum and rudimentary neurals closely applied to the skull. The transverse processes begin on the seventh (or sixth) vertebra and on the two last præcaudal are bridged across; the ribs are attached to the transverse processes; epipleurals are absent on the three last præcaudal vertebræ.

The extraordinary abbreviation of the posterior part of the skull, the great development of the pseudobranchiæ, the peculiar hard scales, unlike those of any other member of this family, and the reduction in number of the vertebræ, are the most important characters which isolate the two genera which constitute this small group.

Inhabitants of the Tropical and Subtropical parts of the Atlantic, Indian, and Pacific Oceans, mostly at great depths.

* Holbrook's figure, however, represents the fish as exactly three times as long as deep, without the caudal fin.

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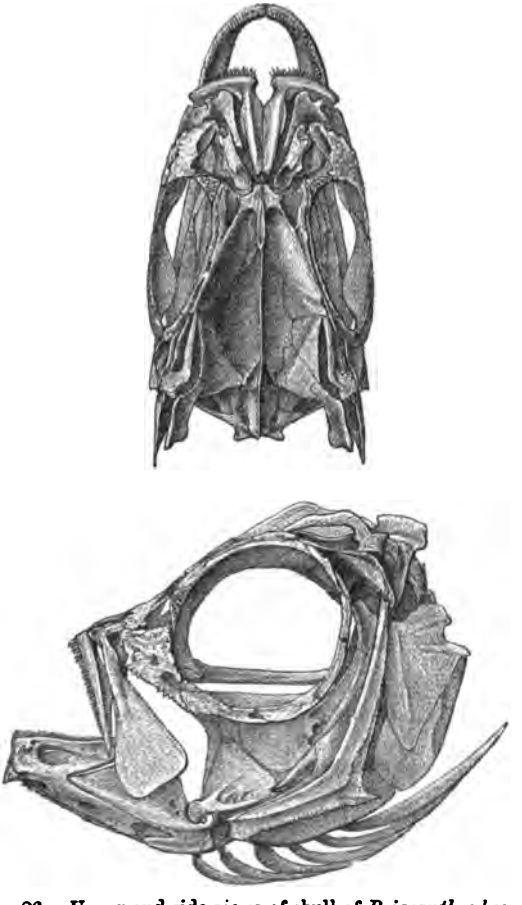

Fig. 26.—Upper and side views of skull of *Priacanthus boops*.

## 47. PRIACANTHUS.

Priacanthus, *Cuv. Règne Anim.* ii. p. 281 (1817); *Bleek. Atl. Ichth.* vii. p. 12 (1876), *and Arch. Néerl.* xi. 1876, p. 251; *Morrison, Proc. Ac. Philad.* 1889, p. 160.

Priacanthus, part., *Cuv. & Val.* iii. p. 96 (1829); *Günth. Cat.* i. p. 215 (1859); *Jord. & Gilb. Syn. Fish. N. Am.* p. 544 (1882).

Body strongly compressed; scales very small, smooth or spinulose with a crescentic or angular sclerous plate on its posterior border *. Lateral line complete, the tube straight and extending along the whole length of the scale. Mouth large, protractile, its cleft nearly

* This plate more developed in proportion in the young than in the adult.

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vertical, with prominent chin; maxillary exposed, without supplemental bone; villiform teeth in jaws and on vomer and palatines; tongue smooth; head entirely scaly; posterior nostril very large, vertically elliptic or slit-like and close to the very large eye; præopercle denticulated, with a more or less distinct spine at the angle; opercle with a short flat spine. Gill-membranes separate; six branchiostegals; pseudobranchiæ very large; gill-rakers long. A single dorsal, with X 12–15 rays, the spinous portion longer than the soft. Anal as much developed as the soft dorsal, with III 12–15 rays. Caudal truncate or emarginate. Pectorals asymmetrical, pointed, with 19 or 20 rays, upper longest. Ventrals very large, close together, in advance of base of pectoral, attached to the belly by membrane, enclosing a more or less marked ventral groove; spine very strong. Vertebræ 22–23 (9–10+13).

*Synopsis of the Species.*

I. Tenth dorsal spine not more than twice as long as second and not more than ⅓ length of head *.

A. Dorsal with 12 or 13 soft rays, anal with 13 or 14; spine at angle of præopercle strong.

1. Dorsal and ventral spines strongly spinulose; ventral shorter than head without mandible; length of head less than depth of body; caudal truncate ..... 1. *cruentatus*, p. 352.

2. Dorsal and ventral spines feebly spinulose; ventral as long as head; depth of body nearly equal to length of head.

Sc. 95–108; l. l. 68–83; caudal feebly emarginate. 2. *macracanthus*, p. 354.

Sc. 77–88; l. l. 52–67; caudal crescentically emarginate in the adult, with the lobes more or less produced ..... 3. *tayenus*, p. 355.

B. Dorsal and anal with 14 or 15 soft rays; spine at angle of præopercle short, indistinct in old specimens; ventral nearly as long as head.

Sc. 100–120; l. l. 75–80; dorsal spines without spinules in the adult; caudal crescentic in the adult, with the lobes more or less produced.... 4. *hamrur*, p. 355.

Sc. 98–115; l. l. 68–73; dorsal spines feebly spinulose; caudal truncate or feebly emarginate ..... 5. *arenatus*, p. 356.

II. Tenth dorsal spine more than twice as long as second and at least ⅓ length of head; dorsal and anal with 12 or 13 soft rays; ventral at least as long as head; caudal truncate ..... 6. *boops*, p. 357.

## 1. Priacanthus cruentatus.

Labrus cruentatus, *Lacép. Poiss.* iii. p. 522, pl. ii. fig. 3 (1802).
Priacanthus cepedianus, *Desmarest, Mém. Soc. Linn. Paris*, ii. 1823, *Déc. ichth.* p. 9, pl. i.†; *Poey, Repert. fis. Cuba*, i. 1866, p. 273.

* The mandible is reckoned in the length of the head.

† *Cf.* Jordan, Proc. U.S. Nat. Mus. vii. 1884, p. 293, from whom this quotation is taken.

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Priacanthus carolinus, *Less. Voy. Coquille, Poiss.* p. 224 (1826); *Cuv. & Val.* iii. p. 105 (1829); *Bleek. Nat. Tijdschr. Nederl. Ind.* ii. 1851, p. 235; *Günth.* i. p. 219 (1859), *and Fische Südsee*, p. 17, pl. xviii. (1873); *Bleek. Nederl. Tijdschr. Dierk.* iv. 1873, p. 174, *and Atl. Ichth.* vii. p. 13, pl. cccli. fig. 5 (1876); *Sauv. Hist. Madag., Poiss.* p. 121 (1891).

Priacanthus macrophthalmus, part., *Cuv. & Val. t. c.* p. 97; *Günth.* i. p. 215.

Priacanthus cruentatus, *Cuv. & Val. t. c.* p. 102; *Morrison, Proc. Ac. Philad.* 1889, p. 162.

Priacanthus boops, part., *Cuv. & Val. t. c.* p. 103.

? Priacanthus argenteus, *Cuv. & Val. t. c.* p. 109.

Priacanthus boops, *Val. in Webb & Berthel. Iles Canar., Ichth.* p. 12, pl. iii. fig. 2 (1843); *Peters, Mon. Berl. Ac.* 1855, p. 431; *Poey, Proc. Ac. Philad.* 1863, p. 183; *Sauv. l. c.* p. 121.

Priacanthus blochii, part., *Günth. t. c.* p. 218; *Day, Fish. Ind.* p. 48, pl. viii. fig. 2 (1875), *and Faun. Ind., Fish.* i. p. 482, fig. (1889).

Priacanthus schlegelii, *Hilgend. Sitzb. Ges. naturf. Fr.* 1879, p. 79.

D. X 12–13. A. III 14. Sc. 100–120 $\frac{9-12}{48-56}$; l. l. 62–76.

Depth of body 2½ to 2⅔ times in total length, length of head 3 to 3¼ times. Snout ½ to ⅔ diameter of eye, which is 2⅙ to 2½ times in length of head (without mandible); interorbital width 3¼ to 3½ times in length of head; spine at angle of præopercle rather strong, serrated, ⅛ to ⅓ diameter of eye. 16 to 18 gill-rakers on lower part of anterior arch. Dorsal spines subequal from the fourth, the last 1⅔ to 2 times as long as second and ⅔ to ½ length of head; longest soft rays not much longer than longest spines; spines strongly spinulose, soft rays smooth or feebly spinulose. Pectoral ½ to ⅔ length of head. Ventral ⅔ to ¾ length of head, the spine strongly spinulose and ½ to ⅔ length of head. Third anal spine nearly as long as last dorsals; spines spinulose, soft rays feebly so. Caudal truncate. Scales mostly ciliated, at least above the lateral line. Red above, silvery beneath; soft dorsal and anal with more or less distinct, round, grey or red spots; back often with more or less distinct dark red or purplish cross-bars or large spots.

Total length 260 millim.

Tropical and Subtropical Atlantic and Pacific Oceans, Indian Ocean.

| | | |
|---|---|---|
| *a*. Ad. | Bermuda. | J. M. Jones, Esq. [P.]. |
| *b, c*. Hgr., skin. | Jamaica. | Parnell Collection. |
| *d–f*. Ad. | St. Croix. | |
| *g*. Ad., skin. | W. Indies. | Purchased. |
| *h, i*. Ad. | St. Helena. | J. C. Melliss, Esq. [P.]. |
| *k*. Ad. | Samoa. | Rev. S. J. Whitmee [P.]. |
| *l–m*. Ad. & yg. | Tahiti. | Museum Godeffroy. |
| *n*. Ad. | Ponape, Caroline Ids. | Museum Godeffroy. |
| *o*. Ad. | Moluccas. | |
| *p*. Yg. | Amboyna. | |
| *q*. Hgr. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *r*. Yg. | —— ? | |



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## 2. Priacanthus macracanthus.

Priacanthus macracanthus, *Cuv. & Val.* iii. p. 108 (1829); *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 48; *Günth.* i. p. 220 (1859); *Casteln. Proc. Linn. Soc. N. S. W.* iii. 1878, p. 360; *Sauv. Hist. Madag., Poiss.* p. 125 (1891).

Priacanthus benmebari, *Temm. & Schleg. Faun. Japon., Pisc.* p. 19, pl. vii. fig. 1 (1844); *Richards. Rep. Ichth. China*, p. 237 (1846); *Günth.* i. p. 218 (1859), *and Ann. & Mag. N. H.* (3) xx. 1867, p. 57.

Priacanthus bleekeri, *Casteln. Proc. Zool. Soc. Vict.* ii. 1873, p. 100.

Priacanthus hamrur, part., *Bleek. Atl. Ichth.* vii. p. 13 (1876); *Sauv. l. c.*

Plectropoma ocellatum (*errore*), *Tenison-Woods, Fish. N. S. Wales*, pl. iv. (1882).

D. X 13. A. III 14 (13). Sc. 95–108 $\frac{8-10}{36-40}$; l. l. 68–83.

Depth of body nearly equal to length of head, 3 to 3½ times in total length. Snout half as long as diameter of eye, which is 2⅓ to 2½ times in length of head (without mandible); interorbital width 3½ to 4 times in length of head; spine at angle of præopercle strong, spinulose, ⅓ to ½ diameter of eye. 20 to 26 gill-rakers on lower part of anterior arch. Dorsal spines gradually increasing in length to the last, which is 1½ to 1⅔ as long as second and ½ to ⅔ length of head; longest soft rays not much longer than longest spine; spines and soft rays feebly spinulose. Pectoral ⅔ to ⅘ length of head. Ventral as long as head, the spine ¾ to ⅘ its length. Third anal spine as long as fourth dorsal; spines and soft rays feebly spinulose. Caudal feebly emarginate. Scales mostly ciliated. Red above, silvery beneath; membrane between the dorsal, anal, and ventral fins with more or less distinct, round, olive or brown spots.

Total length 320 millim.

Western Tropical Pacific Ocean.

| | | |
|---|---|---|
| *a.* Ad., stffd. | Japan. | Leyden Museum. |
| *b.* Hgr. | Japan. | |
| *c–d, e.* Ad. | Formosa. | R. Swinhoe, Esq. [C.]. |
| *f.* Yg. | Off Banda. | H.M.S. 'Challenger.' |
| *g–h.* Hgr. | Arafura Sea. | H.M.S. 'Challenger.' |
| *i–k, l–m.* Ad. | Port Jackson. | G. Krefft, Esq. [P.]. |
| *n.* Ad. | Port Jackson. | Imperial Institute [P.]. |
| *o–p.* Ad. | —— ? | |

Under the name of *Priacanthus fax*, Cuvier & Valenciennes have described, vii. p. 473 (1831), very young specimens from Mauritius which are probably referable to *P. macracanthus*. They are redescribed and figured by Sauvage, Hist. Madag., Poiss. p. 126, pl. xvi. fig. 1 (1891).

*Priacanthus junonis*, De Vis, Proc. Linn. Soc. N. S. W. ix. 1884, p. 392, founded on a small specimen from the coast of Queensland, is also perhaps a synonym of this species.

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### 3. Priacanthus tayenus.

Priacanthus tayenus, *Richards. Rep. Ichth. China*, p. 237 (1846); *Günth.* i. p. 221 (1859); *Bleek. Nederl. Tijdschr. Dierk.* iv. 1873, p. 172, *and Atl. Ichth.* vii. p. 12, pl. cccxlix. fig. 4 (1876).
Priacanthus holocentrum, *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 48; *Günth. t. c.* p. 220; *Day, Faun. Ind., Fish.* p. 482 (1889).
Priacanthus schmittii, *Bleek. Nat. Tijdschr. Nederl. Ind.* iii. 1852, p. 572; *Günth. l. c.*

D. X 12. A. III 13. Sc. 77–88 $\frac{8-9}{34-35}$; l. l. 52–67.

Depth of body nearly equal to length of head, $2\frac{3}{4}$ to 3 times in total length. Snout half as long as diameter of eye, which is 2 to $2\frac{1}{4}$ times in length of head (without mandible); interorbital width 4 to 5 times in length of head; spine at angle of præopercle strong, spinulose, $\frac{1}{4}$ to $\frac{1}{3}$ diameter of eye. 18 gill-rakers on lower part of anterior arch. Dorsal spines gradually increasing in length to the last, which is $1\frac{1}{2}$ to $1\frac{2}{3}$ as long as the second and $\frac{1}{2}$ length of head (without mandible); middle soft rays produced in the adult, nearly as long as head; spines and soft rays feebly spinulose. Pectoral $\frac{1}{2}$ length of head. Ventral nearly as long as head, the spine $\frac{3}{4}$ its length. Third anal spine as long as sixth or seventh dorsal; spines and soft rays feebly spinulose. Caudal notched in the adult, with the lobes more or less produced, especially the upper. Scales not ciliated. Red above, silvery beneath; membrane between the ventral rays with round purplish-black spots, the largest near the belly.

Total length 225 millim.

East coast of India, coast of China, Malay Archipelago.

| | | |
|---|---|---|
| *a*. Ad. | Canton. | J. R. Reeves, Esq. [P.]. (Type.) |
| *b–f*. Yg. | Madras. | F. Day, Esq. [P.]. |
| *g*. Hgr. | Sumatra. | |
| *h*. Hgr., dry. | ——? | |

### 4. Priacanthus hamrur.

Sciæna hamrur, *Forsk. Descr. Anim.* p. 45 (1775).
Anthias macrophthalmus, *Bloch, Ausl. Fische*, vi. p. 115, pl. cccxix. (1792).
Anthias hamur, *Bl. Schn. Syst.* p. 307 (1801).
Lutjanus hamrur, *Lacép. Poiss.* iv. pp. 178 & 209 (1802).
Priacanthus hamruhr, *Cuv. & Val.* iii. p. 104 (1829); *Günth.* i. p. 219 (1859); *Klunz. Verh. zool.-bot. Ges. Wien*, xx. 1870, p. 708; *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 239; *Klunz. Fische Roth. Meer.* p. 17 (1884); *Day, Faun. Ind., Fish.* i. p. 482 (1889).
Priacanthus speculum, *Cuv. & Val.* vii. p. 471 (1831); *Val. in Cuv. R. An. Illustr., Poiss.* pl. xi. fig. 1 (1836); *Günth. t. c.* p. 221; *Playf. Proc. Zool. Soc.* 1867, p. 850; *Sauv. Hist. Madag., Poiss.* p. 117, pl. xiv. fig. 2 (1891).
Priacanthus hamrur, part., *Rüpp. N. Wirbelth. Abyss., Fische*, p. 95 (1840); *Bleek. Nederl. Tijdschr. Dierk.* iv. 1873, p. 176, *and Atl. Ichth.* vii. p. 13, pl. ccclxiii. fig. 3 (1876); *Sauv. l. c.* p. 125.



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Priacanthus dubius, *Temm. & Schleg. Faun. Japon., Pisc.* p. 19 (1844); *Günth. t. c.* p. 221.
Priacanthus japonicus (*non C. & V.*), *Bleek. Nat. Tijdschr. Nederl. Ind.* ii. 1851, p. 171.
Priacanthus blochii, *Bleek. Nat. Tijdschr. Nederl. Ind.* iv. 1853, p. 456.
Priacanthus blochii, part., *Günth. t. c.* p. 218; *Day, Fish. Ind.* p. 48 (1875).

D. X 14–15. A. III 14–15. Sc. 100–120 $\frac{9-11}{38-46}$; l. l. 75–80.

Depth of body 3 to $3\frac{1}{2}$ times in total length, length of head $3\frac{1}{4}$ to $3\frac{1}{2}$ times. Snout $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye, which is $2\frac{1}{3}$ to $2\frac{1}{2}$ times in length of head (without mandible); interorbital width $3\frac{1}{2}$ to 4 times in length of head; spine at angle of præopercle short, indistinct in old specimens. 18 to 23 gill-rakers on lower part of anterior arch. Dorsal spines gradually increasing in length to the last, which is $1\frac{1}{2}$ to $1\frac{3}{4}$ as long as second and $\frac{1}{2}$ to $\frac{3}{5}$ length of head; longest soft rays not much longer than longest spine; spines feebly spinulose in the young, merely striated in the adult; soft rays feebly spinulose. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head. Ventral nearly as long as head, the spine $\frac{3}{5}$ to $\frac{2}{3}$ its length. Third anal spine as long as sixth or seventh dorsal; the spinules on the spines disappearing in the adult. Caudal crescentic in the adult, the lobes more or less produced. Scales spinulose. Red above, silvery beneath, the fins usually blackish towards the edge.

Total length 360 millim.

Indian Ocean, China Sea.

| | | |
|---|---|---|
| *a.* Ad., stffd. | Red Sea. | Rüppell Collection. |
| *b.* Ad., stffd. | Zanzibar. | Sir B. Frere [P.]. |
| *c.* Ad., skin. | Zanzibar. | Sir Lambert Playfair [C.]. |
| *d.* Ad. | Seychelles. | Sir Lambert Playfair [P.]. |
| *e, f.* Ad., skins. | Ceylon. | H. Nevill, Esq. [P.]. |
| *g.* Yg. | Madras. | F. Day, Esq. [P.]. |
| *h.* Yg. | Amboyna. | |
| *i.* Hgr., skin. | Japan. | |

### 5. Priacanthus arenatus.

Priacanthus macrophthalmus (*non Bl.*), part., *Cuv. & Val.* iii. p. 97 (1829); *Günth.* i. p. 215 (1859).
Priacanthus arenatus, *Cuv. & Val. t. c.* p. 101; *Jord. & Gilb. Syn. Fish. N. Am.* p. 971 (1882).
Priacanthus fulgens, *Lowe, Tr. Zool. Soc.* ii. 1839, p. 174.
Priacanthus catalufa, *Poey, Proc. Ac. Philad.* 1863, p. 182; *Morrison, Proc. Ac. Philad.* 1889, p. 161.
Priacanthus macrophthalmus, *Kner, Novara, Fische*, p. 39 (1865); *Poey, Repert. Cuba*, i. 1866, p. 272; *Trosch. Arch. f. Nat.* 1866, p. 198; *Jord. & Gilb. op. cit.* p. 544.

D. X 14–15. A. III 15. Sc. 98–115 $\frac{9-10}{40-45}$; l. l. 68–73.

Depth of body $2\frac{3}{4}$ to $3\frac{1}{5}$ times in total length, length of head 3 to $3\frac{1}{3}$ times. Snout $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye, which is $2\frac{1}{3}$ to $2\frac{1}{2}$ times in length of head (without mandible); interorbital width $3\frac{2}{3}$ to 4

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times in length of head; spine at angle of præopercle short, indistinct in old specimens. 20 to 23 gill-rakers on lower part of anterior arch. Dorsal spines gradually increasing in length to the last, which is $1\frac{2}{3}$ to 2 times as long as second, and $\frac{1}{2}$ to $\frac{3}{5}$ length of head; longest soft rays not much longer than longest spine; spines feebly spinulose, soft rays more strongly so. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head. Ventral as long as head, the spine $\frac{2}{3}$ to $\frac{3}{4}$ its length. Third anal spine as long as sixth or seventh dorsal; spines and soft rays spinulose. Caudal truncate or slightly emarginate. Scales spinulose. Red above, silvery beneath, without spots.

Total length 350 millim.

Tropical and Subtropical Atlantic.

| | | |
|---|---|---|
| *a*. Ad. | Cuba. | Zoological Society. |
| *b, c*. Hgr., skins. | Jamaica. | Parnell Collection. |
| *d*. Ad. | St. Croix. | |
| *e*. Ad. | St. Thomas. | Mus. of Comp. Zoology. |
| *f–h*. Hgr. & yg. | W. Indies. | |
| *i*. Hgr., skin. | W. Indies. | Purchased. |
| *k*. Yg. | Rio Janeiro. | Mus. of Comp. Zoology. |
| *l*. Ad. | Madeira. | Rev. R. T. Lowe [P.]. |
| *m*. Ad. | Madeira. | J. Y. Johnson, Esq. [P.]. |
| *o–p*. Hgr. | Lagos. | Mr. Ussher [C.]. |
| *q*. Ad., skel. | Madeira. | Rev. R. T. Lowe [P.]. |

### 6. Priacanthus boops.

Anthias boops (*Forst.*), *Bl. Schn. Syst.* p. 308 (1801).
Priacanthus boops, part., *Cuv. & Val.* iii. p. 103 (1829).
Priacanthus bonariensis, *Cuv. & Val. t. c.* p. 105; *Günth. t. c.* p. 216.
Priacanthus japonicus, *Cuv. & Val. t. c.* p. 106, pl. l.; *Temm. & Schleg. Faun. Japon., Pisces*, p. 20 (1844); *Günth. t. c.* p. 217; *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 239, and xlviii. 1883, pl. i. fig. 1.
Priacanthus macropus, *Cuv. & Val.* vii. p. 469 (1831); *Quoy & Gaim. Voy. Astrolabe, Zool.* iii. p. 668, *Poiss.* pl. vii. fig. 1 (1834); *Sauv. Hist. Madag., Poiss.* p. 119, pl. xiv. fig. 1 (1891).
Priacanthus macropterus, *Cuv. & Val. t. c.* p. 471; *Quoy & Gaim. l. c.* p. 669, fig. 2.
Perca boops, *Forst. Descr. Anim.* p. 411 (1844).
Priacanthus boops, *Günth. t. c.* p. 216.
Priacanthus alticlarens, *Val. C. R. Ac. Sc.* liv. 1862, p. 1168; *Sauv. l. c.* p. 127, pl. xvi. fig. 3.
Priacanthus supraarmatus, *Hilgend. Sitzb. Ges. nat. Fr.* 1879, p. 79.

D. X 12–13. A. III 12–13. Sc. 90–100 $\frac{10-12}{45-53}$; l. l. 50–66.

Depth of body $2\frac{1}{4}$ to $2\frac{2}{5}$ times in total length, length of head $2\frac{2}{5}$ to 3 times. Snout $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye, which is $2\frac{1}{5}$ to $2\frac{2}{3}$ times in length of head (without mandible); interorbital width 3 to $3\frac{1}{2}$ times in length of head; spine at angle of præopercle rather large, smaller in old specimens. 18 gill-rakers on lower part of anterior arch. Dorsal spines strong, striated, feebly spinulose, gradually increasing in length to the last, which is $2\frac{1}{2}$ to 3 times as long as

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second and $\frac{3}{5}$ to $\frac{3}{4}$ length of head; anterior soft rays considerably longer. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral at least quite as long as the head, reaching to $1\frac{1}{2}$ its length, the spine $\frac{3}{5}$ to $\frac{6}{7}$ length of head. Third anal spine as long as ninth dorsal; spines and soft rays spinulose. Caudal truncate or slightly convex. Scales spinulose. Red above, silvery beneath, the fins with a narrow blackish edge; membrane between the ventral rays black.

Total length 480 millim.

South Atlantic, Indian, and West Pacific Oceans.

| | | |
|---|---|---|
| *a.* Ad. | St. Helena. | J. C. Melliss, Esq. [P.]. |
| *b, c.* Ad. & hgr., skins. | St. Helena. | Gen. Hardwicke [P.]. |
| *d.* Hgr. | S. America. | Sir R. Schomburgk [P.]. |
| *e.* Hgr., stffd. | Cape of Good Hope. | Sir A. Smith [P.]. |
| *f.* Ad. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *g.* Ad., stffd. | Muscat. | A. S. G. Jayakar, Esq. [P.]. |
| *h–k.* Hgr. | Japan. | |
| *l.* Ad. | Bay of Tokio. | |
| *m.* Yg. | China Sea. | Sir E. Belcher [P.]. |
| *n.* Ad., skel. | St. Helena. | J. C. Melliss, Esq. [P.]. |

## 48. PSEUDOPRIACANTHUS.

Priacanthus, part., *Cuv. & Val* iii. p. 90 (1829); *Günth. Cat.* i. p. 215 (1859); *Jord. & Gilb. Syn. Fish. N. Am.* p. 544 (1882).

Pseudopriacanthus, *Bleek. Verst. Ak. Amst.* (2) iii. 1869, p. 241, *Atl. Ichth.* vii. p. 14 (1876), *and Arch. Néerl.* xi. 1876, p. 251; *Morrison, Proc. Ac. Philad.* 1889, p. 160.

Body strongly compressed; scales large, hard, striated and denticulated. Lateral line complete, the tube straight and extending along the whole length of the scale. Mouth large, protractile, its cleft nearly vertical, with prominent chin; maxillary exposed, without supplemental bone; villiform teeth in jaws and on vomer and palatines; head entirely scaly; posterior nostril very large, vertically elliptic, close to the very large eye; præopercle denticulated, without spine; opercle with a short flat spine. Gill-membranes separate; six branchiostegals; pseudobranchiæ very large; gill-rakers long. A single dorsal, with X 11–12 rays, the spinous portion longer than the soft. Anal as much developed as the soft dorsal, with III 9–11 rays. Pectorals asymmetrical, rounded, with 18 or 19 rays, upper longest. Caudal rounded. Ventrals in advance of base of pectoral, large, close together, attached to the belly by membrane, with a very strong spine.

West Pacific and Indian Oceans, Atlantic coast of North America and Cuba.

### 1. Pseudopriacanthus niphonius.

Priacanthus niphonius, *Cuv. & Val.* iii. p. 107 (1829); *Temm. & Schleg. Faun. Japon., Pisces,* p. 21, pl. vii. A. (1844); *Günth.* i. p. 217 (1859); *Bleek. Acta Soc. Sc. Ind. Neerl.* viii. 1860, *Vischf. Jap.* p. 73.

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Myripristis refulgens, *Val. C. R. Ac. Sc.* liv. 1862, p. 1169.
Pseudopriacanthus niphonius, *Bleek. Versl. Akad. Amst.* (2) iii. 1869, p. 241, *and Atl. Ichth.* vii. p. 14, pl. cccl. fig. 5, and cccliv. fig. 3 (1876).
Priacanthus meyeri, *Günth. Proc. Zool. Soc.* 1871, p. 656, pl. lxvii.; *Sauv. Bull. Soc. Philom.* (7) vi. 1882, p. 168, *and Hist. Madag., Poiss.* p. 131 (1891).
Priacanthus (Pseudopriacanthus) niphonius, *Steind. & Döderl. Denkschr. Ak. Wien*, xlvii. 1883, p. 239.
Priacanthus refulgens, *Sauv. Hist. Madag., Poiss.* p. 129, pl. v. fig. 5.

D. X 11–12. A. III 10–11. Sc. 55–59 $\frac{5-6}{30-34}$; l. l. 34–40.

Depth of body 2 to 2¼ times in total length, length of head 2½ to 3 times. Snout ⅓ to ½ diameter of eye, which is 1⅓ to 2 times in length of head (without mandible); interorbital width 3 to 4½ times in length of head. 17 gill-rakers on lower part of anterior arch. Dorsal originating above base of pectoral; spines strongly striated, middle longest, ⅔ to ¾ length of head and as long as or longer than longest soft rays. Pectoral ⅔ to ⅔ length of head. Ventral about ¾ length of head. Second and third anal spines nearly equal, as long as tenth dorsal. Caudal rounded. Red above, silvery beneath; the soft fins edged with blackish; young with dark cross-bands.

Total length 275 millim.

West Pacific and Indian Oceans (Japan, Celebes, Mauritius).

| | | |
|---|---|---|
| *a*. Ad. | Japan. | |
| *b*, *c*. Ad., stffd. | Japan. | |
| *d*. Ad. | Manado, Celebes. | Dr. A. B. Meyer [C.]. (Type of *P. meyeri*.) |

## 2. Pseudopriacanthus altus.

Priacanthus altus, *Gill, Proc. Ac. Philad.* 1862, p. 132; *Jord. & Gilb. Syn. Fish. N. Am.* p. 545 (1882).
Pseudopriacanthus altus, *Bleek. Versl. Ak. Amst.* (2) iii. 1869, p. 242; *Jord. & Eigenm. Proc. U.S. Nat. Mus.* x. 1887, p. 269; *Morrison, Proc. Ac. Philad.* 1889, p. 163.

Very closely allied to the preceding. Dorsal X 11–12. Anal III 9. Scales 40–50; l. l. 37. Scarlet-red; ventrals tipped with black.

Atlantic coast of America, from Rhode Island to Cuba.

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## Subfam. 4. CENTROPOMINÆ.

**Maxillary exposed, not slipping under the præorbital. Scales not deciduous; lateral line extending on the caudal fin; a scaly process at base of ventrals. Anal fin with three spines. Subocular lamina of suborbital produced behind in a pointed process. Pseudobranchiæ small, rudimentary, or absent.**

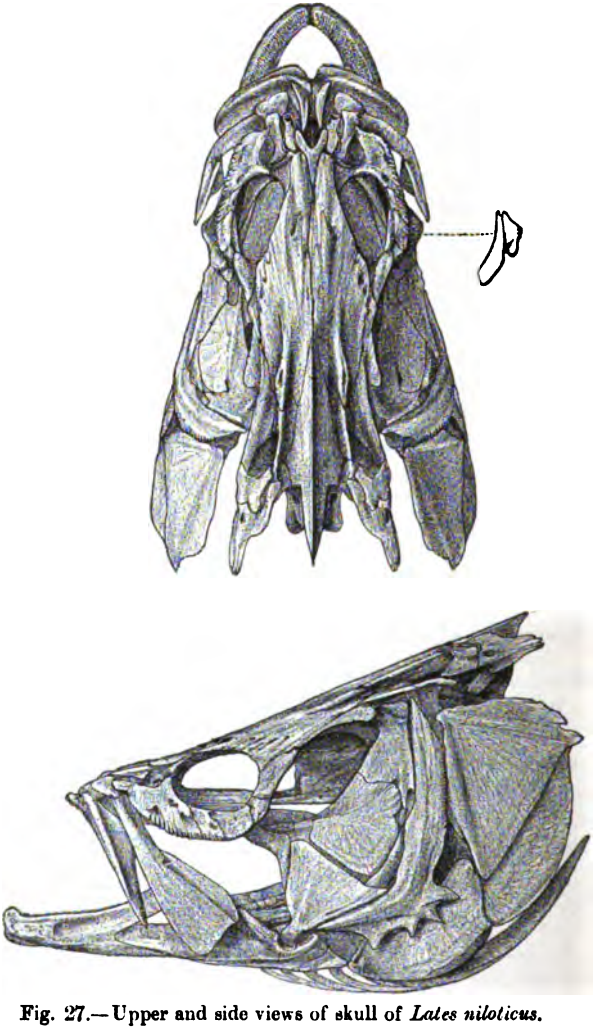

Fig. 27.—Upper and side views of skull of *Lates niloticus*.
The second suborbital is represented detached, to show the posterior subocular process.

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The structure of the vertebral column is shown in the following table (*cf.* pp. 2 & 115):—

| | A. | B. | C. | D. | E. | F | G. | H. |
|---|---|---|---|---|---|---|---|---|
| *Lates niloticus* | 25 | 12 | 2 | 5 | 0 | 5 | 1-2 | 13 |
| —— *calcarifer* | 25 | 12 | 2 | 5 | 0 | 5 | 3 | 13 |
| *Psammoperca waigiensis* | 25 | 11 | 2 | 3 | 0 | 6 | 3 | 14 |
| *Centropomus ensiferus* | 24 | 10 | 2 | 4 | 0 | 4 | 1 | 14 |

The air-bladder is large and thick, with or without appendages.

Freshwater and marine fishes of Tropical Africa and Asia, North Australia, and Tropical America.

A most natural group, connecting the *Serranidæ* with the *Sciænidæ*.

*Synopsis of the Genera.*

I. Opercle ending in a spine; dorsal fins connected at the base.

Tongue smooth; lower border of præopercle with spines ..... 49. LATES, p. 361.

Tongue with a patch of teeth; lower border of præopercle entire ..... 50. PSAMMOPERCA, p. 364.

II. Opercle without spine; præopercle with a double ridge; dorsal fins completely separated ..... 51. CENTROPOMUS, p. 366.

## 49. LATES.

Centropomus, part., *Lacép. Poiss.* iv. p. 248 (1802).
Holocentrus, part., *Lacép. t. c.* p. 327.
Coius, part., *Ham. Buch. Fish. Ganges*, p. 85 (1822).
Lates, *Cuv. & Val.* ii. p. 88 (1828); *Günth. Cat.* i. p. 67 (1859); *Gill, Proc. Ac. Philad.* 1861, p. 52; *Steind. Verh. zool.-bot. Ges. Wien*, xii. 1864, p. 504; *Ramsay & Douglas-Ogilby, Proc. Linn. Soc. N. S. W.* (2) ii. 1887, p. 182; *Jord. & Eigenm. Bull. U.S. Fish Comm.* viii. 1890, p. 335.
Plectropoma (*non C. & V.*), *Bleek. Arch. Néerl.* xi. 1876, p. 263.
Pseudolates, *Alleyne & Macleay, Proc. Linn. Soc. N. S. W.* i. 1877, p. 262.

Body compressed; scales moderate or rather large, finely denticulated. Lateral line complete, extending on the base or nearly to the extremity of the caudal fin, the tube straight and occupying the basal half of the exposed part of the scale. Mouth large, protractile; maxillary exposed, with supplemental bone; bands of villiform teeth in jaws and on vomer, palatines, and ectopterygoids; no teeth on the tongue; head partly scaled; præopercle with serrated posterior

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border, a strong spine at angle and a few on lower border, the anterior being antrorse; opercle ending in a spine. Gill-membranes separate; seven branchiostegals; pseudobranchiæ very small or absent; gill-rakers long. Two dorsals, connected at the base, with VII–VIII, I 10–12 rays, the two subequal in length. Anal short, with III 8–9 rays. Dorsal and anal moving in a more or less distinct scaly sheath, the soft portion covered with scales. Caudal rounded. Pectoral short, symmetrical, rounded, with 16 or 17 rays. Ventrals below the base of the pectorals, close together, with a strong spine and a produced pointed scale at its base. Posterior processes of præmaxillaries short; supraoccipital bone extending forwards beyond the parietals, with a strong but low crest along its entire length; parietal crests produced on the frontal bones as far as the supraoccipital. Vertebræ 25 (12+13).

Nile, Niger, and Senegal; mouths of rivers and coasts of South-eastern Asia and North Australia.

### 1. Lates niloticus.

Perca nilotica, *Hasselq. Iter*, p. 359 (1757); *Linn. S. N.* i. p. 483 (1766).
Perca nilotica, part., *Gmel. S. N.* i. p. 1312 (1789).
Centropomus niloticus, *Lacép. Poiss.* iv. p. 277 (1802).
Perca latus, *Geoffr. Descr. Egypte, Poiss.* p. 280, pl. ix. fig. 1 (1809).
Lates niloticus, *Cuv. & Val.* ii. p. 89 (1828), and iii. p. 490 (1829); *Günth.* i. p. 67 (1859); *Steind. Sitzb. Ak. Wien*, lx. i. 1869, p. 672, pl. i.

D. VII–VIII, II 11–12. A. III 8–9. Sc. 65–73 $\frac{8-11}{19-23}$; l. l. 65–73.

Shape of body very variable, its depth $2\frac{2}{3}$ to 4 times in the total length. Length of head 3 to $3\frac{1}{2}$ times in total length; upper profile more or less concave; diameter of eye equal to or a little shorter than the snout, $\frac{1}{4}$ (young) to $\frac{1}{6}$ (adult) length of head; lower jaw projecting; maxillary extending to below posterior border of eye or beyond, the width of its distal extremity at least $\frac{3}{4}$ diameter of eye; præ- and suborbitals finely serrated; cheeks, opercles, and occiput with large scales; præopercular border forming nearly a right angle, finely serrated on its vertical limb, with three or four strong spines on its lower limb, and with a still stronger spine at its angle; opercular spine about as much developed as the latter; clavicle with some strong denticulations. 16 or 17 gill-rakers on lower part of anterior arch. First and second dorsal spines short, third very strong, longest, $\frac{2}{5}$ to $\frac{3}{5}$ length of head, as long as or longer than the longest soft rays. Pectoral about half as long as head. Anal spines short, second and third equal. Caudal rounded. Lateral line same as number of scales, but produced on to the base of the caudal. Uniform brown or olive above, silvery beneath; young sometimes marbled with brown.

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Total length 1400 millim. Stated to reach 1800 millim. in the Senegal *.

Nile, Niger, and Senegal.

| | | |
|---|---|---|
| *a*. Yg. | Nile. | Consul Petherick [P.]. |
| *b–c*. Hgr. | Chartoum. | Consul Petherick [P.]. |
| *d*. Ad. | Niger. | W. A. Forbes, Esq. [P.]. |
| *e*. Ad., stffd. | W. Africa. | |
| *f*. Hgr. | W. Africa. | |
| *g*. Ad., skel. | Lake of Fayoum, Egypt. | Dr. J. Anderson [P.]. |
| *h*. Ad., skel. | Niger. | W. A. Forbes, Esq. [P.]. |
| *i*. Hgr., skel. | N.E. Africa. | Dr. Rüppell [C.]. |
| *k*. Ad., skull. | W. Africa. | |

## 2. Lates calcarifer.

*Russell, Descr. Fishes*, ii. p. 23, pl. cxxxi. (1803).

Holocentrus calcarifer, *Bloch, Ausl. Fische*, iv. p. 100, pl. ccxliv. (1790).

Perca calcar, *Bl. Schn. Syst.* i. p. 89 (1801).

Holocentrus heptadactylus, *Lacép. Poiss.* iv. p. 344 (1802).

Coius vacti, *Ham. Buch. Fish. Ganges*, p. 86, pl. xvi. fig. 28 (1822).

Lates nobilis, *Cuv. & Val.* ii. p. 96, pl. xiii. (1828); *Richards. Rep. Ichth. China*, p. 222 (1846); *Bleek. Verh. Batav. Gen.* xxii. 1849, *Perc.* p. 27.

Lates calcarifer, *Cuv. & Val. t. c.* p. 100; *Richards. l. c.*; *Günth.* i. p. 68 (1859); *Day, Fish. Malab.* p. 2 (1865); *Günth. Proc. Zool. Soc.* 1870, p. 824; *Day, Fish. Ind.* p. 7, pl. i. fig. 1 (1875); *O'Shaughn. Zool. Rec.* 1875, *Pisc.* p. 9 (1878); *Day, Fish. Ind., Suppl.* p. 779 (1888), *and Faun. Ind., Fish.* i. p. 440, fig. (1889).

Lates heptadactylus, *Cantor, Cat. Mal. Fish.* p. 1 (1850).

Plectropoma calcarifer, *Bleek. Atl. Ichth.* vii. p. 109, pl. cccxxiii. fig. 3 (1876).

Pseudolates cavifrons, *Alleyne & Macl. Proc. Linn. Soc. N. S. W.* i. 1877, p. 262, pl. iii.; *Macl. Proc. Linn. Soc. N. S. W.* ii. 1878, p. 345.

Lates darwiniensis, *Macl. Proc. Linn. Soc. N. S. W.* ii. 1878, p. 345.

D. VII–VIII, I 10–12. A. III 8–9. Sc. 50-60 $\frac{6-7}{13-16}$; l. l. 50–60.

Shape of body very variable, its depth $2\frac{3}{4}$ to 4 times in the total length. Length of head 3 to 4 times in total length; upper profile more or less concave; diameter of eye equal to or a little shorter than snout (half as long in old specimens), $\frac{1}{5}$ (young) to $\frac{1}{8}$ (or even less in old specimens) length of head; lower jaw projecting; maxillary extending considerably beyond vertical of posterior border of eye, the width of its distal extremity nearly equal to diameter of eye; præorbital finely serrated; cheeks, opercles, and occiput with large scales; præopercular border forming an obtuse angle, finely serrated

* Mr. J. J. Lister has submitted to me a photograph of a specimen from the Lake of Fayoum in Egypt, measuring 1270 millim. (50 inches), and weighing 92 lbs. The skeleton presented by Dr. Anderson measures 1400 millim. (55 inches).

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on its vertical limb, with three or four strong spines on its lower limb, and with a still stronger spine at its angle; opercular spine not quite as strong as the latter; clavicular denticulations strong, 16 or 17 gill-rakers on lower part of anterior arch. First and second dorsal spines short, third very strong, longest, ½ to ⅔ length of head, as long as or longer than the longest soft rays. Pectoral about half as long as head. Anal spines short, third longest. Caudal rounded. Grey or olive above, silvery beneath; dorsal, anal, and caudal fins more blackish in the young.

Total length 850 millim.; grows to 1700.

Coasts and mouths of rivers of South-eastern Asia, from India and Southern China, to North Australia.

| | | |
|---|---|---|
| *a.* Hgr., skin. | W. coast of India. | Sir L. Playfair [P.]. |
| *b, c.* Ad., stffd. | Madras. | |
| *d.* Ad., stffd. | Ganges. | |
| *e–l.* Hgr. & yg. | Sittang R., Burma. | E. W. Oates, Esq. [P.]. |
| *m.* Hgr., stffd. | China. | East India Co. |
| *n.* Hgr., skin. | China. | J. R. Reeves, Esq. [P.]. |
| *o.* Yg. | China. | |
| *p, q.* Hgr., skins. | China Sea. | |
| *r.* Yg. | Amoy. | R. Swinhoe, Esq. [P.]. |
| *s.* Yg., skin. | Malay Peninsula. | Dr. Cantor. |
| *t.* Yg. | Baram R., Sarawak. | C. Hose, Esq. [C.]. |
| *u–w.* Ad. & hgr. | Fitzroy R., Queensland. | P. L. Sclater, Esq. [P.]. |
| *x.* Ad. | Fitzroy R. | J. Jardine, Esq. [P.]. |
| *y.* Ad., skel. | Fitzroy R. | J. Jardine, Esq. [P.]. |

## 50. PSAMMOPERCA.

Labrax, part., *Cuv. & Val.* ii. p. 55 (1828).

Psammoperca, *Richards. Zool. Ereb. & Terr., Fish.* p. 115 (1846); *Günth. Cat.* i. p. 69 (1859); *Gill, Proc. Ac. Philad.* 1861, p. 50; *Steind. Verh. zool.-bot. Ges. Wien*, xii. 1862, p. 564; *Günth. Ann. & Mag. N. H.* (4) x. 1872, p. 426; *Bleek. Arch. Néerl.* xi. 1876, p. 264.

Cnidon, *Müll. & Trosch. Hor. Ichth.* iii. p. 21 (1849); *Günth. l. c.* p. 68; *Gill, l. c.* p. 52.

Hypopterus, *Gill, l. c.* p. 50; *Bleek. l. c.* p. 264.

Body compressed; scales moderate, denticulated. Lateral line complete, extending nearly to the end of the caudal fin, the tube straight and confined to the basal half of the exposed part of the scale. Mouth rather large, protractile; maxillary exposed, with supplemental bone; crowded small granular teeth in jaws and on vomer, palatines, and ectopterygoids; tongue with a small patch of teeth posteriorly; head scaly; præopercle with serrated posterior border, a strong spine at the angle, and an entire lower border; opercle ending in a spine. Gill-membranes separate; seven branchiostegals; pseudobranchiæ very small or absent; gill-rakers long. Two dorsals, connected at the base, with VII, I 12–15 rays, the spinous shorter than the soft. Anal short, with III 9–13 rays. Dorsal and anal moving in a scaly sheath, the soft portion covered

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with scales. Caudal rounded. Pectorals subsymmetrical, rounded, with 16 rays. Ventrals below the base of the pectorals, close together, with a strong spine and a scaly pointed process at its base. Posterior processes of præmaxillaries short; supraoccipital bone large, extending forwards beyond the parietals; supraoccipital and parietal crests strong, extending forwards on the frontals to between the orbits. Vertebræ 25 (11+14).

Indian and Pacific Oceans, from the Bay of Bengal and the China Sea to the North coast of Australia.

### 1. Psammoperca vaigiensis.

Labrax waigiensis, *Cuv. & Val.* ii. p. 83 (1828); *Bleek. Nat. Tijdschr. Ned. Ind.* ii. 1851, p. 479.

Psammoperca datnioides, *Richards. Zool. Ereb. & Terr., Fish.* p. 116, pl. lvii. figs. 1 & 2 (1846).

Cnidon chinensis, *Müll. & Trosch. Hor. Ichth.* iii. p. 21 (1849); *Günth.* i. p. 68 (1859).

Psammoperca waigiensis, *Bleek. Nat. Tijdschr. Ned. Ind.* v. 1853, p. 177; *Günth. l. c.* p. 69; *Kner, Novara, Fische*, p. 13 (1865); *Günth. Ann. & Mag. N. H.* (4) x. 1872, p. 426; *Bleek. Atl. Ichth.* vii. p. 108, pl. cccvi. fig. 2 (1876); *Macleay, Proc. Linn. Soc. N. S. W.* v. 1880, p. 307.

D. VII, I 12–13. A. III 9. Sc. 45–50 $\frac{6-7}{12}$; l. l. 45–50.

Depth of body nearly equal to length of head, 3 to 3⅓ times in total length. Upper profile of head usually more or less concave; diameter of eye equal to or a little shorter than snout, ⅓ to ¼ length of head, and a little greater than interorbital width; jaws equal in front; maxillary extending to below centre of eye, the width of its distal extremity about half diameter of eye; præorbital entire; snout naked, granulate, top and sides of head with large scales; præopercular spine stronger than opercular 11 to 13 gill-rakers on lower part of anterior arch. Dorsal originating behind vertical of axilla; spines strong, third longest, at least twice as long as second, and half as long as head; soft portion as deep as and a little longer than spinous. Pectoral about half length of head. First anal spine shorter, second as long as and stronger than third, about as long as second dorsal spine. Caudal rounded. Olive-brown above, yellowish below, without any spots.

Total length 320 millim.

From the Southern coast of China and the East coast of India to the North coast of Australia.

| | | |
|---|---|---|
| *a.* Hgr., skin. | Victoria R., Australia. | H.M.S. 'Herald.' (Type.) |
| *b.* Ad. | Australia. | G. Krefft, Esq. [P.]. |
| *c.* Ad., stffd. | Hammond Id., Torres Straits. | H.M.S. 'Herald.' |
| *d.* Ad. | Cebu, Philippines. | Dr. A. B. Meyer [C.]. |
| *e.* Ad., skin. | China Sea. | |
| *f–g.* Ad. | Borneo. | A. Everett, Esq. [C.]. |

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| | | |
|---|---|---|
| *h.* Ad., skin. | Singapore. | Government of Singapore [P.]. |
| *i.* Ad. | Singapore. | Government of Singapore [P.]. |
| *k.* Ad. | Madras Coast. | E. Thurston, Esq. [C.]. |
| *l.* Hgr. | Ceylon. | H. Nevill, Esq. [P.]. |
| *m.* Ad., skel. | Madras Coast. | E. Thurston, Esq. [C.]. |

### 2. Psammoperca macroptera.

Psammoperca macroptera, *Günth.* i. p. 69 (1859).
Hypopterus macropterus, *Gill, Proc. Ac. Philad.* 1861, p. 50.

D. VII, I 15. A. III 13.

Body shorter than in the preceding, its greatest depth 2½ times in the total length. Præorbital serrated; maxillary extending to below anterior third of eye. Soft portion of dorsal considerably longer than the spinous; longest spine (3rd) ⅔ length of head, and longer than the soft rays. Anal as long as soft dorsal.

Total length 140 millim.

N. Australia.

| | | |
|---|---|---|
| *a.* Skin, bad state. | Victoria R. | H.M.S. 'Herald.' (Type.) |

## 51. CENTROPOMUS.

Centropomus, part., *Lacép. Poiss.* iv. p. 248 (1802).
Centropomus, *Cuv. & Val.* ii. p. 102 (1828); *Günth. Cat.* i. p. 79 (1859); *Gill, Proc. Ac. Philad.* 1861, p. 48; *Vaill. & Bocourt, Miss. Sc. Mex., Poiss.* p. 5 (1874); *Jord. & Gilb. Syn. Fish. N. Am.* p. 528 (1882); *Gill, Proc. U.S. Nat. Mus.* v. 1882, p. 484.
Oxylabrax, *Bleek. Arch. Néerl.* xi. 1876, p. 264.

Body compressed; scales moderate or small, spinulous, finely denticulated. Lateral line complete, extending to the end of the caudal fin, the tube straight and confined to the basal half of the exposed part of the scale. Mouth rather large, protractile; maxillary exposed, with supplemental bone; bands of villiform teeth with obtuse crowns in jaws and on vomer and palatines; no teeth on the tongue; head partly scaled; præopercle with a double ridge, serrated and spinous; opercle without spines; subopercle produced into a lobe. Gill-membranes separate; seven branchiostegals; pseudobranchiæ present but small; gill-rakers long. Two dorsals, completely separated and subequal in length, with VII–VIII, I 9–10 rays. Anal short, with III 6–7 rays. These fins moving in more or less distinct scaly sheaths. Caudal forked. Pectorals asymmetrical, obtusely pointed, with 15 or 16 rays, upper longest. Ventrals behind base of pectorals, close together, with a strong spine and a scaly process at its base. Posterior processes of præmaxillaries short; upper surface of skull with large, elongate muciferous cavities; supraoccipital and parietal bones very short;

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supraoccipital crest moderately strong and short. Vertebræ 24 (10+14).

Fresh waters and coasts of Tropical America.

*Synopsis of the Species.*

I. Sc. 70–90 $\frac{9-12}{15-19}$.

A. Second anal spine not longer than third.

Anal with 6 soft rays*; the second and third spines equal in length, $\frac{1}{3}$ to $\frac{1}{2}$ length of head.. 1. *undecimalis*, p. 367.

Anal with 6 soft rays, the second spine slightly shorter than the third, and $\frac{2}{3}$ length of head .. 2. *nigrescens*, p. 368.

Anal with 7 soft rays, the second spine slightly shorter than the third, and $\frac{3}{4}$ length of head .. 3. *pectinatus*, p. 368.

B. Second anal spine longer than third, $\frac{1}{2}$ to $\frac{2}{3}$ length of head. 4. *parallelus*, p. 369.

II. Sc. 50–65 $\frac{5-9}{11-14}$.

A. Second anal spine longer than third; anal with 6 soft rays.

Second anal spine longer than caudal peduncle, $\frac{1}{2}$ to $\frac{2}{3}$ length of head..... 5. *ensiferus*, p. 369.

Second anal spine shorter than caudal peduncle, $\frac{1}{2}$ length of head..... 6. *unionensis*, p. 370.

B. Second anal spine not longer than third; anal with 7 soft rays..... 7. *pedimacula*, p. 371.

## 1. Centropomus undecimalis.

Sciæna undecimalis, *Bloch, Ausl. Fische*, vi. p. 60, pl. cccliii. (1792).
Platycephalus undecimalis, *Bl. Schn. Syst.* i. p. 59 (1801).
Centropomus undecim-radiatus, *Lacép. Poiss.* iv. p. 268 (1802).
Perca loubina, *Lacép. t. c.* p. 418.
Sphyræna aureoviridis, *Lacép. op. cit.* v. p. 327, pl. ix. fig. 2 (1803).
Centropomus undecimalis, part., *Cuv. & Val.* ii. p. 102, pl. xiv. (1828); *Günth.* i. p. 79 (1859).
Centropomus undecimalis, *Guichen. in R. de la Sagra, Hist. Cuba, Poiss.* p. 9 (1853); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 17, pl. ii. fig. 1 (1874); *Steind. Denkschr. Ak. Wien*, xxxix. 1878, p. 21; *Jord. & Gilb. Syn. Fish. N. A.* p. 528 (1882); *Everm. & Kend. Bull. U.S. Fish Comm.* 1892, pl. xxxvii. (1894).
Centropomus appendiculatus, *Poey, Mem. Cuba*, ii. p. 119 (1860), *and Repert.* ii. p. 280 (1868).
Centropomus appendiculatus, part., *Günth. Tr. Zool. Soc.* vi. 1868, p. 406.
Centropomus viridis, *Lockington, Proc. Calif. Ac.* viii. 1877, p. 110.

D. VII–VIII, I 10. A. III 6. Sc. 75–80 $\frac{9-10}{15-17}$; l.l. 60–72.

Depth of body $3\frac{3}{4}$ to $4\frac{1}{2}$ times in total length, length of head $2\frac{3}{4}$ to 3 times. Snout much longer than diameter of eye, which is contained $4\frac{1}{2}$ (young) to 10 times (adult) in length of head; interorbital width 7 or 8 times in length of head; lower jaw strongly projecting; maxillary extending to below centre or posterior border

* The last of which is cleft to the base.

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of eye, the width of its distal extremity $\frac{1}{2}$ (young) to $\frac{3}{4}$ diameter of eye; præorbital obtusely serrated posteriorly; spines at angle of præopercle strong, one or two on front ridge; cheeks and opercles scaly; supraclavicle with strong spines. Dorsal originating behind vertical of axil; first and second spines very short, third or fourth longest, $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Pectoral $\frac{1}{2}$ to $\frac{2}{3}$ length of head. First anal spine very short, second and third equal in length, second very strong, $\frac{1}{2}$ (young) to $\frac{1}{3}$ length of head. Middle caudal rays about half as long as outer. Air-bladder with a pair of anterior appendages. Silvery or golden, back brownish; lateral line brown or blackish.

Total length 600 millim.; grows to 900.

Atlantic coasts from the Gulf of Mexico and the Caribbean Sea to Rio Janeiro; Pacific coast from Lower California to Peru.

| | | |
|---|---|---|
| *a–b*. Yg. | Rio de Mascota (near mouth), Jalisco. | Dr. A. C. Buller [C.]. |
| *c*. Hgr. | Mexico. | |
| *d*. Hgr. | Chagres R. | Capt. Dow & O. Salvin, Esq. [C.]. |
| *e*. Hgr. | Jamaica. | Institute of Jamaica [P.]. |
| *f–g*. Ad. & hgr. | Jamaica. | Intern. Fisheries Exhib. 1883. |

### 2. Centropomus nigrescens.

Centropomus nigrescens, *Günth. Proc. Zool. Soc.* 1864, p. 144, *and Tr. Zool. Soc.* vi. 1868, p. 407; *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 20, pl. i. bis, fig. 1 (1874).

D. VIII, I 10. A. III 6. Sc. 73–78 $\frac{9-10}{18-20}$.

Very near the preceding species, but differing in the shorter dorsal and anal spines, and the absence of processes to the air-bladder. Fourth dorsal spine $\frac{2}{3}$ length of head. Second anal spine slightly shorter than third, much shorter than caudal peduncle, and $\frac{2}{5}$ length of head. Silvery; back brownish; lateral line blackish.

Total length 300 millim.

Pacific coast of Mexico and Central America.

| | | |
|---|---|---|
| *a*. Ad. | Chiapam, Guatemala. | O. Salvin, Esq. [C.]. (Type.) |
| *b*. Hgr. | Presidio, near Mazatlan. | Hr. A. Forrer [C.]. F. D. Godman, Esq. [P.]. |

### 3. Centropomus pectinatus.

Centropomus undecimalis, part., *Günth.* i. p. 79 (1859).

Centropomus pectinatus, *Poey, Mem. Cuba*, ii. p. 121 (1860), *and Repert.* ii. p. 280 (1868); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 25 (1874).

D. VII–VIII, I 10. A. III 7. Sc. 70–78 $\frac{10-12}{17-18}$; l. l. 52–55.

Distinguished from *C. undecimalis* as follows:—Maxillary extend-

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ing only to below anterior third of eye; præorbital sharply serrated posteriorly. Second or third dorsal spine longest, $\frac{2}{3}$ length of head. Second anal spine slightly shorter than third, slightly longer than caudal peduncle, and about $\frac{2}{3}$ length of head. No appendages to the air-bladder. Lateral line not darker than the ground-colour.

Total length 230 millim.

Coasts and rivers of the West Indies; coast of Brazil.

| | | |
|---|---|---|
| *a*. Hgr. | S. Domingo. | |
| *b*. Ad. | Pernambuco. | J. P. G. Smith, Esq. [P.]. |

### 4. Centropomus parallelus.

Centropomus undecimalis, part., *Günth.* i. p. 79 (1859).

Centropomus parallelus, *Poey, Mem. Cuba*, ii. p. 120 (1860), *and Repert.* ii. p. 280 (1868); *Günth. Tr. Zool. Soc.* vi. 1868, p. 407; *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 22 (1874).

Centropomus appendiculatus, part., *Günth. Tr. Zool. Soc.* vi. 1868, p. 406.

Centropomus mexicanus, *Bocourt, Ann. Sc. Nat.* (5) ix. 1868, p. 90; *Vaill. & Boc. l. c.* p. 23, pl. i. fig. 2.

D. VIII, I 10. A. III 6. Sc. 75–90 $\frac{9-12}{16-19}$; l. l. 65–75.

Maxillary reaching to below centre of eye, or a little beyond; præorbital sharply serrated posteriorly. Third or fourth dorsal spine longest, about $\frac{1}{2}$ length of head. Second anal spine a little longer than third, as long as or a little longer than caudal peduncle, $\frac{2}{3}$ to $\frac{3}{4}$ length of head. No appendages to the air-bladder. Lateral line not dark.

Total length 300 millim.

Rivers and coasts of the West Indies; Atlantic coasts of Tropical America.

| | | |
|---|---|---|
| *a*. Hgr. | S. Domingo. | |
| *b*, *c*. Ad. & yg., skins. | Jamaica. | Parnell Collection. |
| *d–e*. Yg. | Barbados. | F. G. Beckford, Esq. [P.]. |
| *f–g*. Ad. | Mexico. | |
| *h*. Ad. | Chagres R. | Capt. Dow & O. Salvin, Esq. [C.]. |
| *i*. Yg. | British Guiana. | |
| *k*. Ad. | Pernambuco. | Capt. W. H. Milner [P.]. |
| *l*. Yg. | Bahia. | Dr. O. Wucherer [C.]. |
| *m–n*, *o*. Ad. & yg. | Bahia. | |

### 5. Centropomus ensiferus.

Centropomus undecimalis, part., *Günth.* i. p. 79 (1859).

Centropomus ensiferus, *Poey, Mem. Cuba*, ii. p. 122, pl. xii. fig. 1 (1860); *Günth. Tr. Zool. Soc.* vi. 1868, p. 408; *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 33 (1874); *Steind. Denkschr. Ak. Wien*, xxxix. 1878, p. 21; *Jord. Proc. U.S. Nat. Mus.* ix. 1886, p. 39.



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Centropomus armatus, *Gill, Proc. Ac. Philad.* 1863, p. 163; *Günth. Tr. Zool. Soc.* vi. 1868, p. 408; *Vaill. & Boc. l. c.* p. 34, pl. i. ter, fig. 2.
Centropomus affinis, *Steind. Sitzb. Ak. Wien*, xlix. i. 1864, p. 200, pl. i. fig. 1; *Vaill. & Boc. l. c.* p. 31, pl. i. fig. 1.
Centropomus brevis, *Günth. Proc. Zool. Soc.* 1864, p. 145; *Vaill. & Boc. l. c.* p. 36.
Centropomus scaber, *Bocourt, Ann. Sc. Nat.* (5) ix. 1868, p. 90.
Centropomus robalito, *Jord. & Gilb. Proc. U.S. Nat. Mus.* iv. 1882, p. 462.

D. VIII, I 9–10. A. III 6. Sc. 50–60 $\frac{5-7}{11-14}$; l. l. 48–52.

Depth of body 3 to 4 times in total length, length of head $2\frac{2}{3}$ to 3 times. Snout much longer than diameter of eye, which is contained 5 (young) to 7 times in length of head; interorbital width 6 or 7 times in length of head; lower jaw projecting; maxillary extending to below anterior third or centre of eye, the width of its distal extremity about $\frac{2}{3}$ diameter of eye; præorbital sharply serrated posteriorly; strong spines at angle of præopercle, one or two on front ridge; cheeks and opercles scaly; supraclavicle with strong spines. Dorsal originating just behind vertical of axil; third or fourth spine longest, about half length of head. Pectoral about $\frac{2}{3}$ length of head. First anal spine very short; second very strong, longer than third, which is slender, longer than caudal peduncle, and $\frac{3}{5}$ to $\frac{3}{4}$ length of head. Middle caudal rays about half as long as outer. Air-bladder without appendages. Silvery, back darker; a dark blotch on opercle; lateral line not dark.

Total length 300 millim.

Coasts of Tropical America.

| | | |
|---|---|---|
| *a–c.* Hgr. | Presidio, W. Mexico. | Hr. A. Forrer [C.]. F. D. Godman, Esq. [P.]. |
| *d–f.* Ad. | Chiapam. | O. Salvin, Esq. [C.]. |
| *g.* Yg. | Bay of Panama. | O. Salvin, Esq. [P.]. |
| *h.* Ad. | Panama. | Mus. Compar. Zoology. |
| *i–l.* Hgr. & yg. | Colon. | M. Boucard [C.]. |
| *m.* Ad. | Belize. | O. Salvin, Esq. [C.]. |
| *n–p.* Ad. | Jamaica. | Intern. Fisheries Exhib. 1883. |
| *q.* Yg., skin. | Jamaica. | Parnell Collection. |
| *r–s.* Yg. | W. Indies. | |
| *t–u, v–w.* Yg. | British Guiana. | Sir R. Schomburgk [P.]. |
| *x–y.* Yg. | British Guiana. | Dr. Hancock [P.]. |
| *z.* Ad. | Surinam. | |
| *a.* Yg. | —— ? | J. Goodridge, Esq. [C.]. Haslar Collection. (Type of *C. brevis*.) |
| *β.* Skeleton. | —— ? | |

### 6. Centropomus unionensis.

Centropomus unionensis, *Bocourt, Ann. Sc. Nat.* (5) ix. 1868, p. 90; *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 37, pl. i. fig. 3 (1874); *Steind. Sitzb. Ak. Wien*, lxxiv. i. 1876, p. 49.

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D. VIII, I 9. A. III 6. Sc. 50 $\frac{6-8}{12}$.

Distinguished from the preceding by its shorter second anal spine, which slightly exceeds the third, measuring less than the length of the caudal peduncle and about half the length of the head. Lateral line not dark.

Total length 240 millim.

Pacific coast of Central America.

### 7. Centropomus pedimacula.

Centropomus undecimalis, part., *Cuv. & Val.* ii. p. 102 (1828).
Centropomus pedimacula, *Poey, Mem. Cuba*, ii. p. 122 (1860), *and Repert.* ii. p. 280 (1868); *Vaill. & Boc. Miss. Sc. Mex., Poiss.* p. 29 (1874); *Steind. Denkschr. Ak. Wien*, xxxix. 1878, p. 22; *Jord. Proc. U.S. Nat. Mus.* viii. 1885, p. 376.
Centropomus medius, *Günth. Proc. Zool. Soc.* 1864, p. 144, *and Tr. Zool. Soc.* vi. 1868, p. 406; *Vaill. & Boc. l. c.* p. 30.
Centropomus cuvieri, *Bocourt, Ann. Sc. Nat.* (5) ix. 1868, p. 91; *Vaill. & Boc. l. c.* p. 26, pl. i. ter, fig. 1.
Centropomus grandoculatus, *Jenkins & Everm. Proc. U.S. Nat. Mus.* xi. 1888, p. 139.

D. VIII, I 10. A. III 7. Sc. 55–65 $\frac{8-9}{12-14}$; l. l. 50–52.

Distinguished from *C. ensiferus* in having the second anal spine as long as or slightly shorter than the third, and 7 soft rays in the anal fin. Second anal spine as long as or slightly longer than caudal peduncle, and about $\frac{2}{3}$ length of head. Lateral line dark brown or black; ventrals blackish at the end.

Total length 280 millim.

Rivers and coasts of Cuba, Jamaica, and Santo Domingo; coasts of Central America; Atlantic Coast of tropical South America.

| | | |
|---|---|---|
| *a–b.* Ad. | Chiapam, Guatemala. | O. Salvin, Esq. [P.]. (Types of *C. medius.*) |
| *c.* Yg. | Bay of Panama. | O. Salvin, Esq. [C.]. |
| *d.* Ad., skull. | Jamaica. | Institute of Jamaica [P.]. |



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# ADDENDA.

Page 9. **Centrarchus macropterus.**

Add:—

*d.* Ad. Dismal Swamp, Suffolk, Virginia. Prof. Eigenmann.

Page 31. Add a species:—

**3 *a*. Eupomotis haplognathus.**

Lepomis haplognathus, *Cope, Proc. Amer. Philos. Soc.* xxii. 1885, p. 168.

D. X 11. A. III 9. Sc. 35 $\frac{6}{15}$.

Depth of body $2\frac{2}{5}$ times in total length, length of head $3\frac{1}{4}$ times. Diameter of eye $3\frac{1}{2}$ times in length of head; maxillary extending to below anterior border of eye; opercular flap rather long. Gill-rakers rather short and quite obtuse. Ventral nearly reaching anal. Caudal emarginate. Olivaceous, yellowish below; a blue band crosses the præorbital above, and another follows the præmaxillary border and passes along the inferior border of the orbit; below this, another blue line crosses the cheek; opercular flap plain black.

Total length 113 millim.

Monterey, Nuevo Leon, North Mexico.

I am indebted to Prof. Jordan for pointing out to me the omission of this species.

Page 135. **Macquaria australasica.**

Add:—

Macquaria australasica, *Douglas-Ogilby, Nat. Science*, vi. 1895, p. 71.

Page 180. **Epinephelus boenack.**

Add:—

*y.* Hgr. Pulo Satang, Sarawak. Rajah Brooke [P.].

Page 348. **Rhypticus saponaceus.**

Add:—

*z.* Ad. Carthagena, Colombia. Capt. W. H. Milner [P.].

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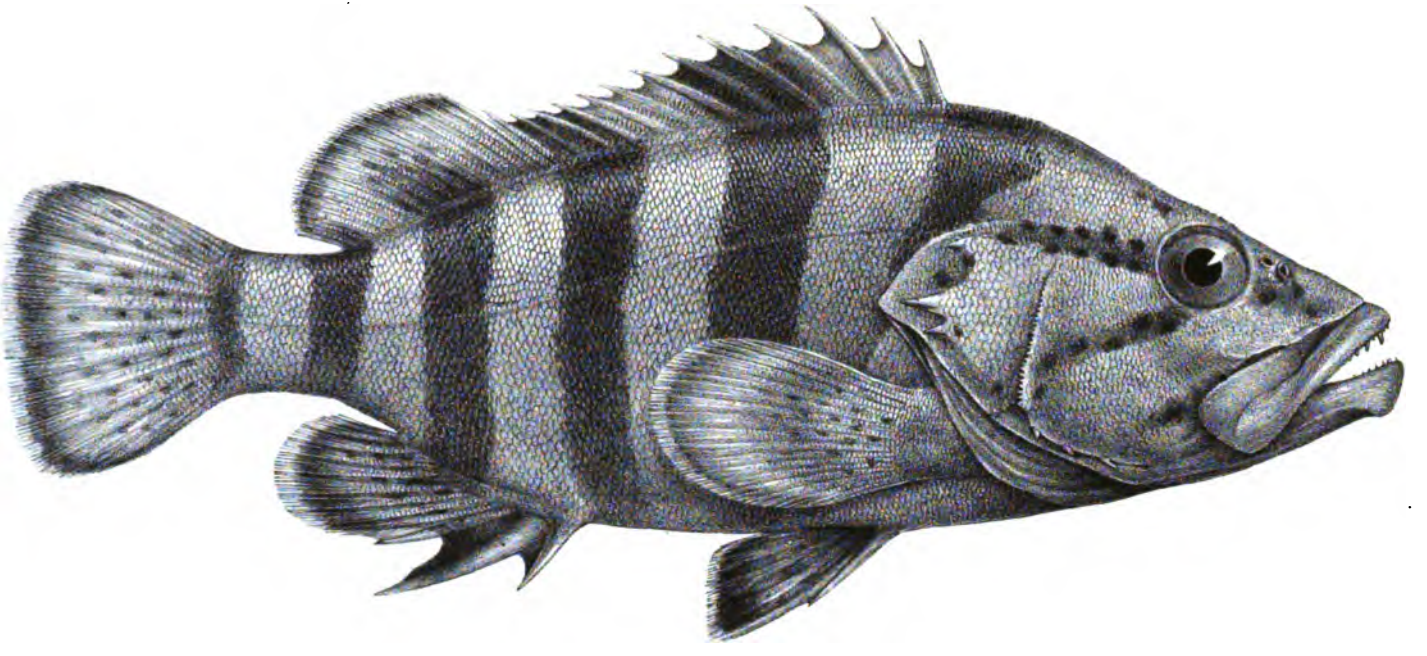

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*Acanthistius cinctus.*

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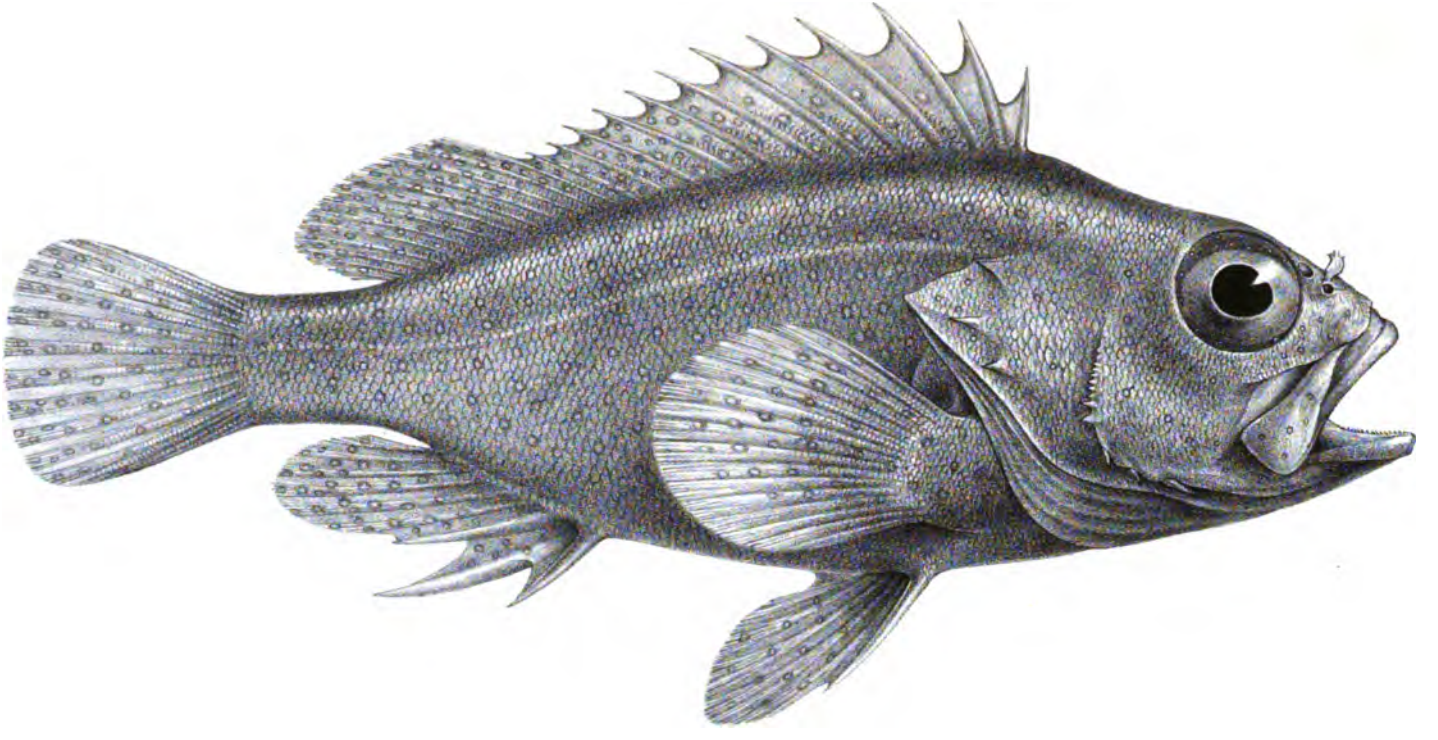

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*Trachypoma macracanthus.*

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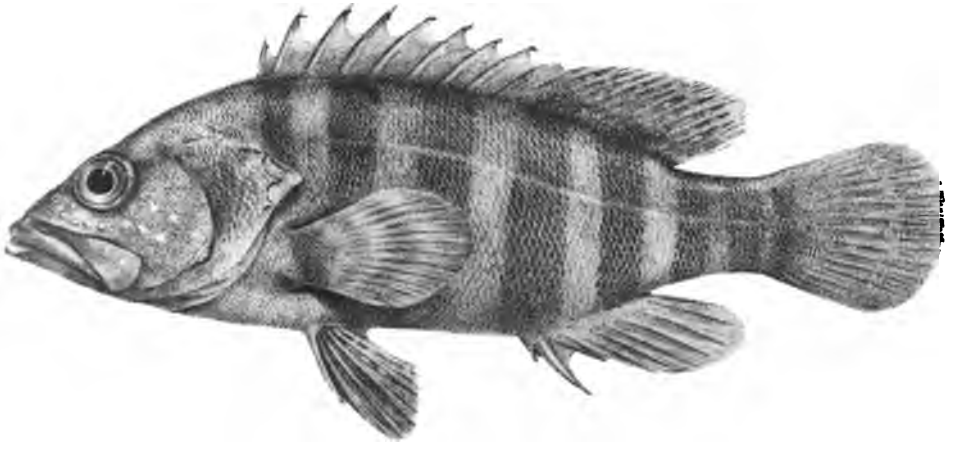

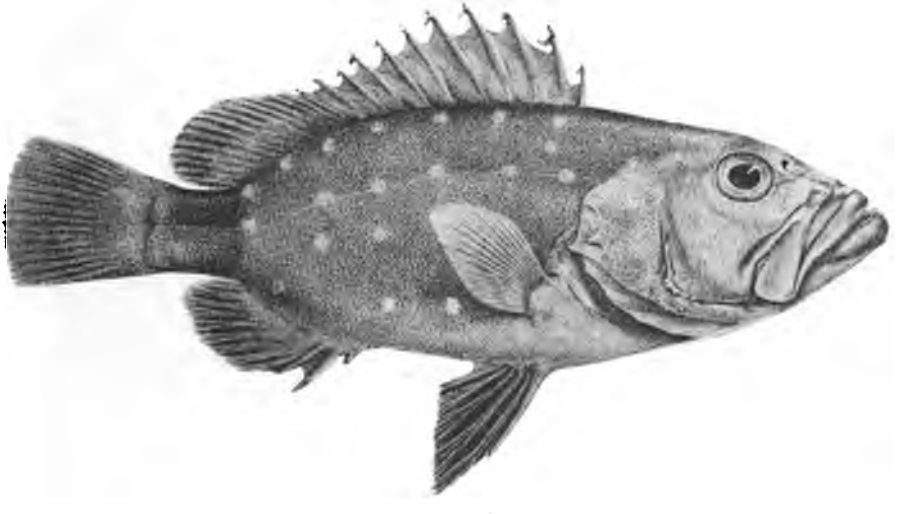

B.

*A. Epinephelus nigri.* *B. Epinephelus niveatus.*

G H Ford. Morgan & Kan. lithotype

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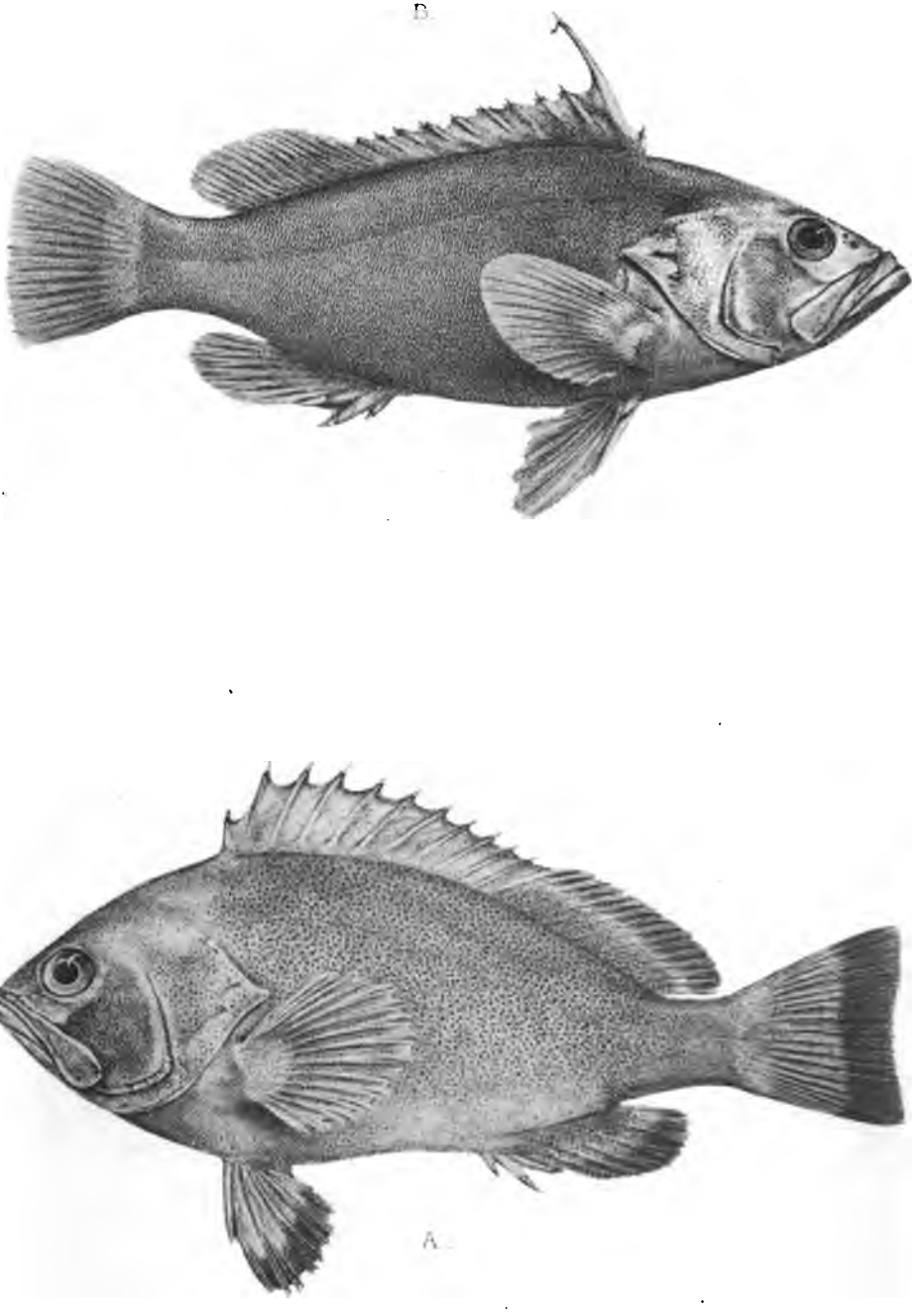


*A. Epinephelus flavocaeruleus. B. Epinephelus spiniger.*

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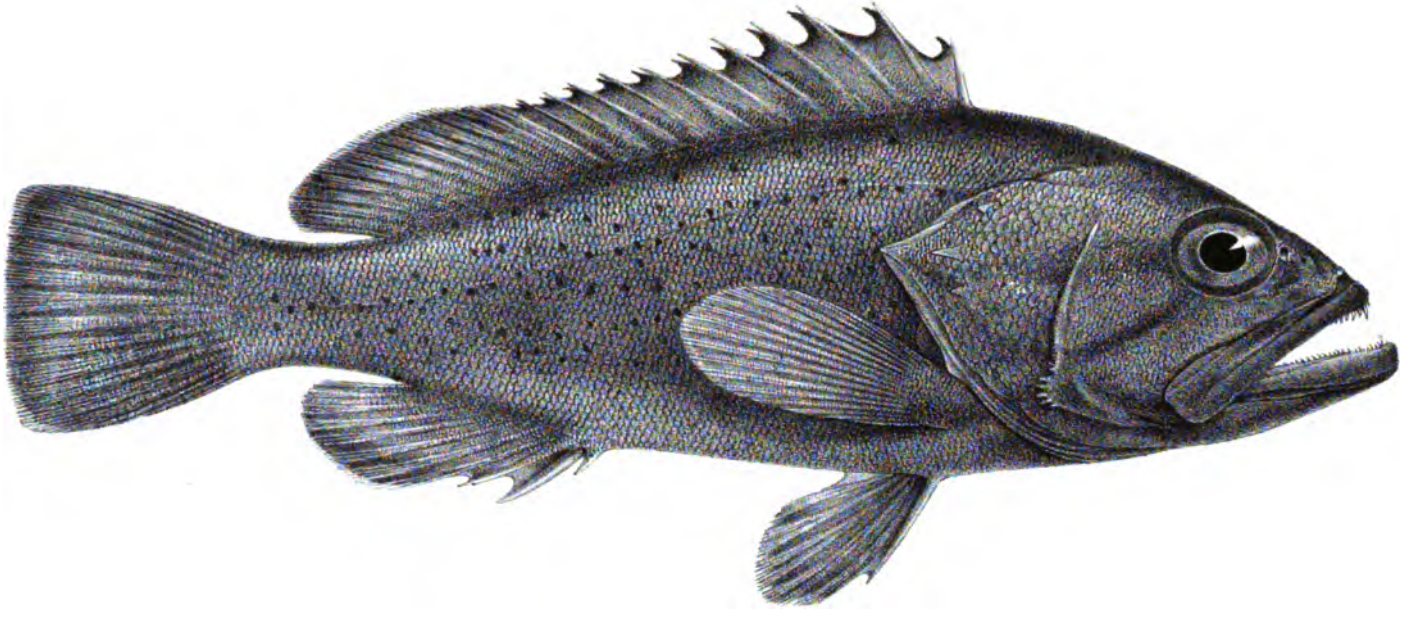

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*Epinephelus præopercularis*

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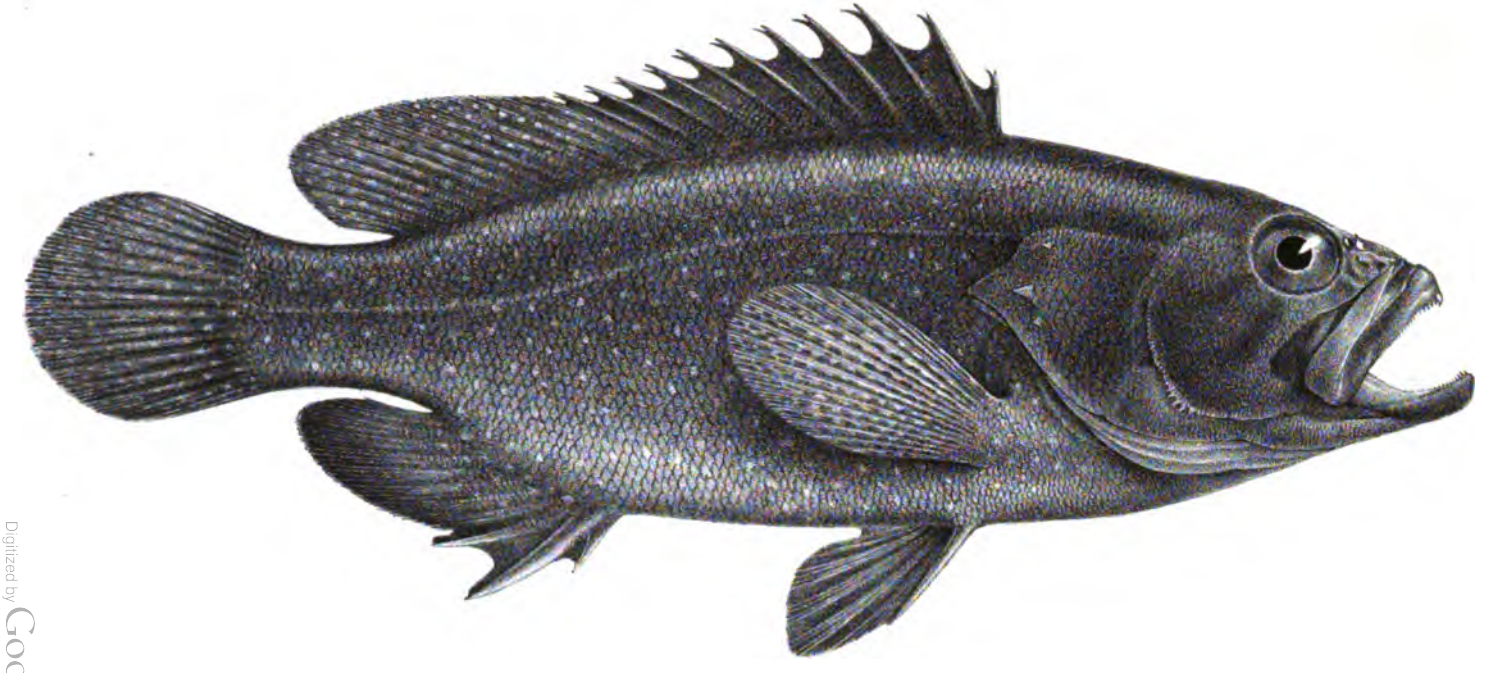

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*Epinephelus australis.*

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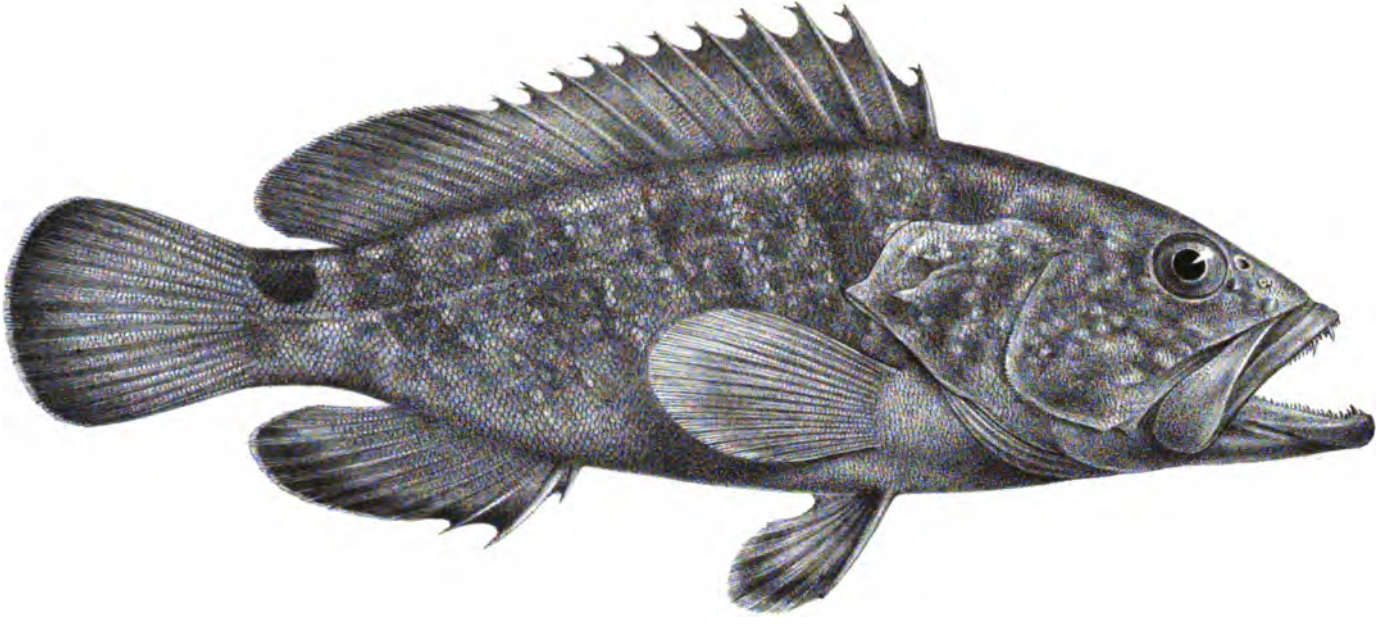

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*Epinephelus dæmelii.*

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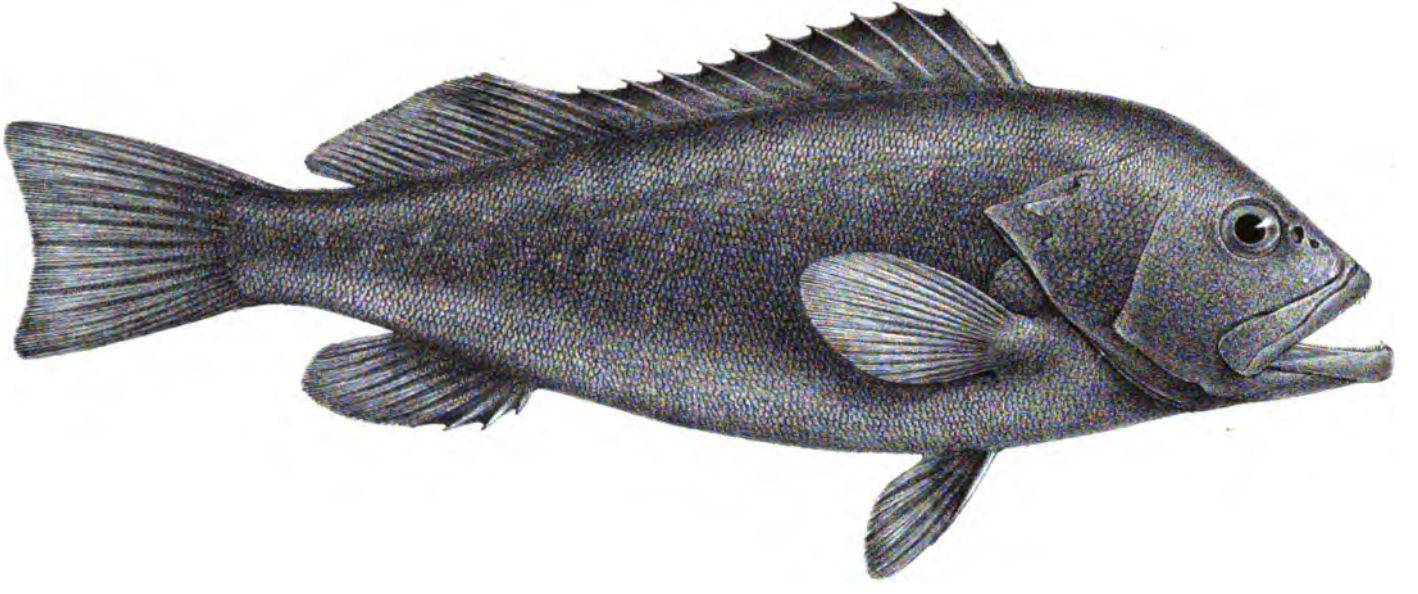

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*Epinephelus javakari.*

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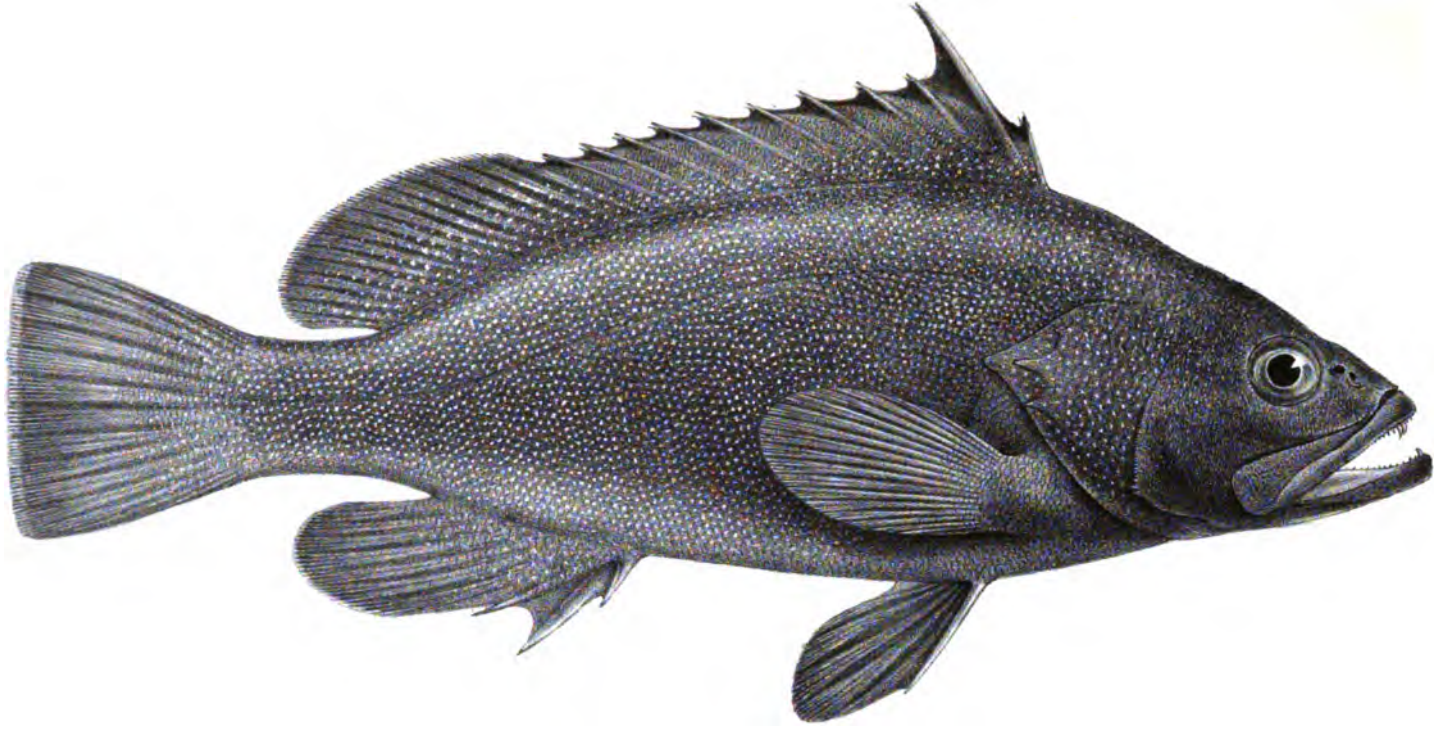

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*Epinephelus albopunctulatus.*

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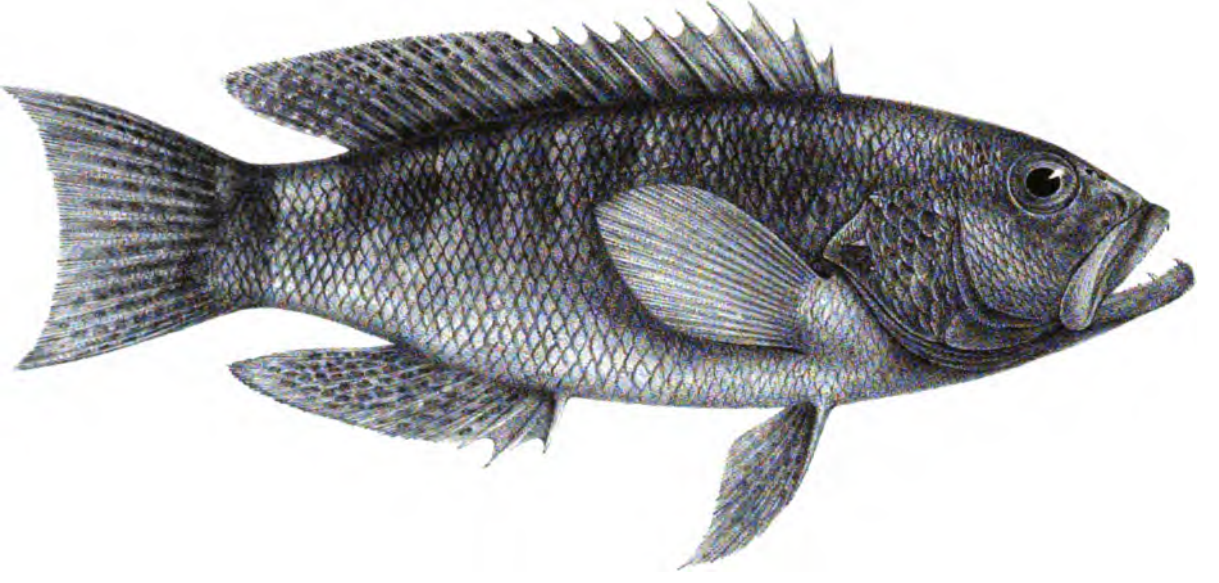

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***Serranus bulleri.***

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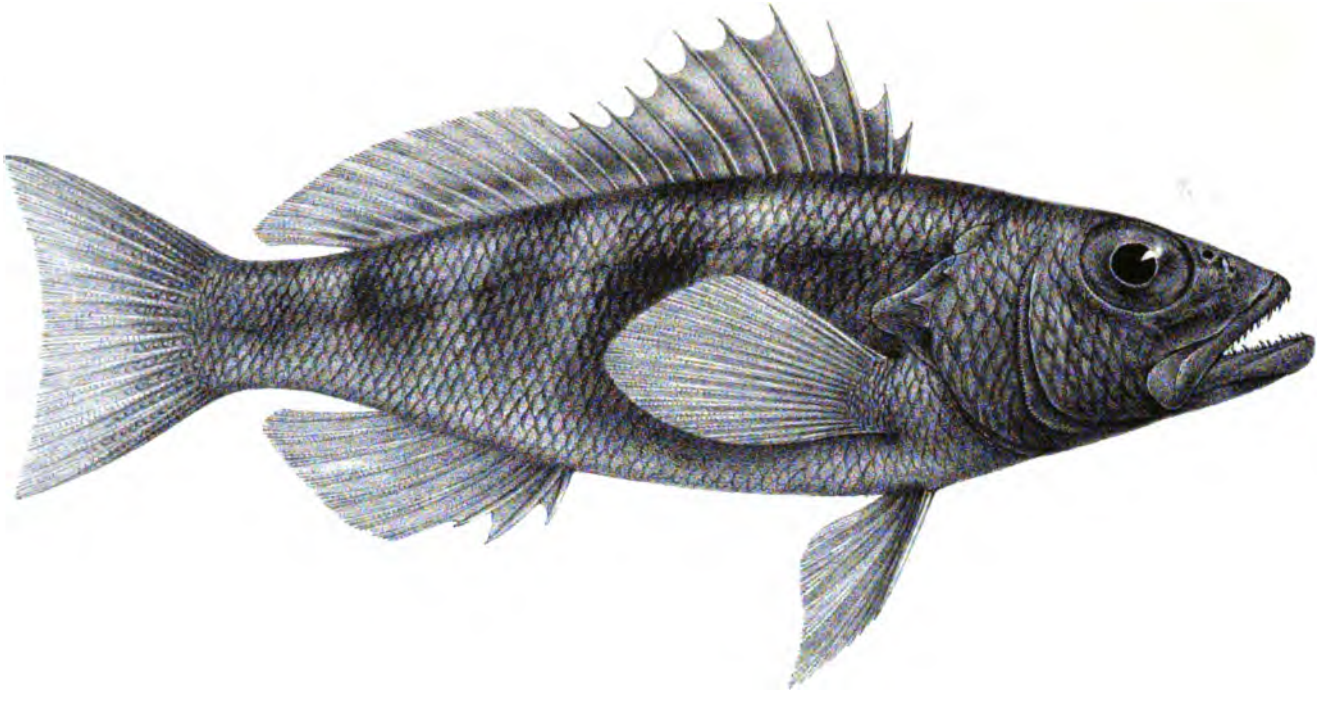

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*Serranus sanctæ-helenæ.*

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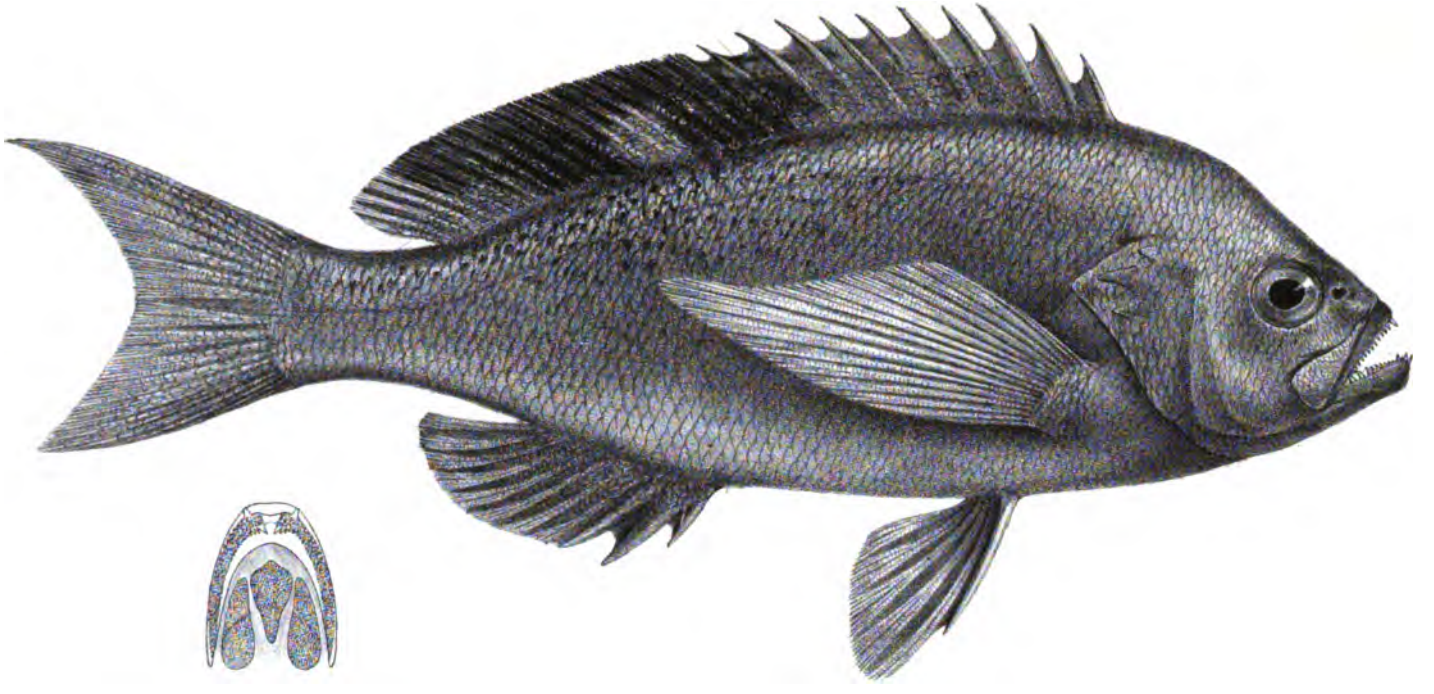

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*Caprodon longimanus.*

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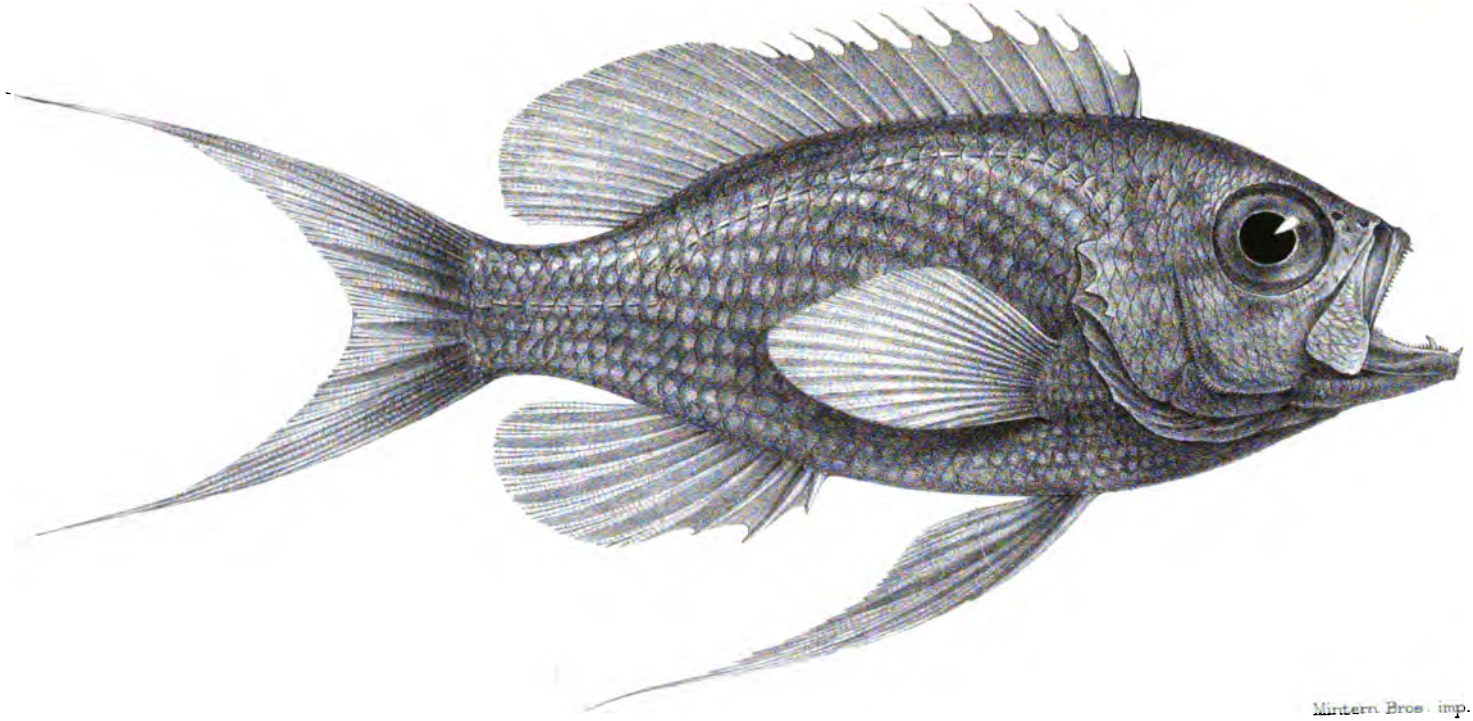

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*Anthias asperilinguis.*

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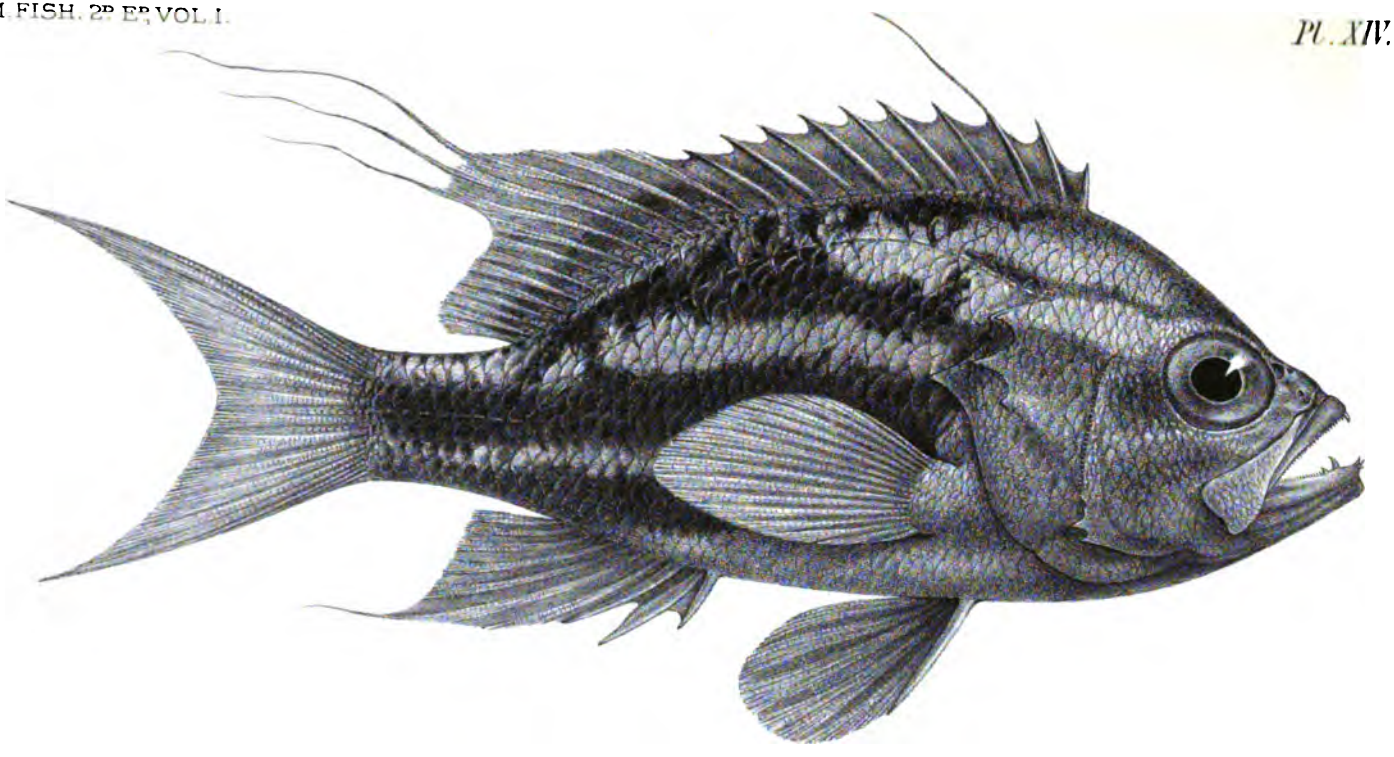

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*Anthias formosus.*

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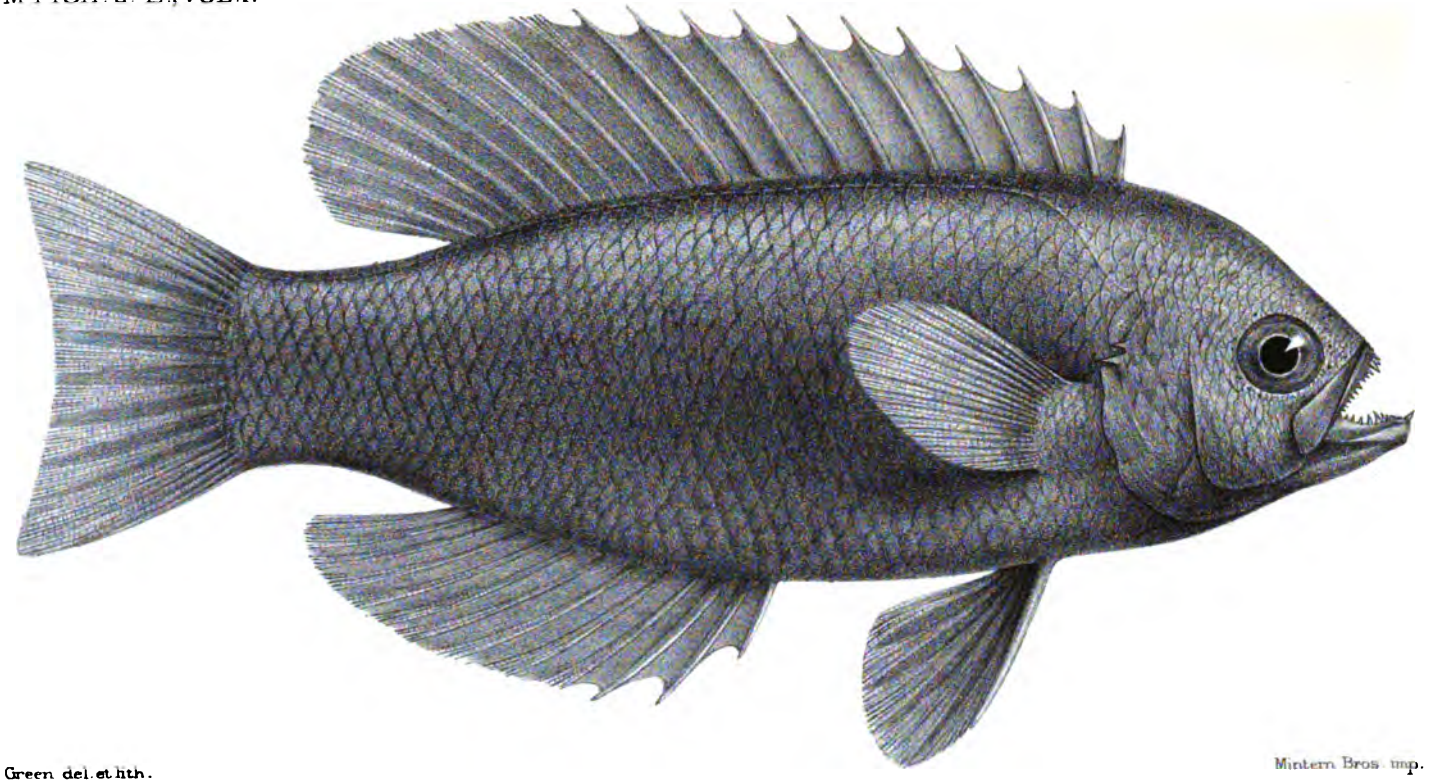

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*Callanthias allporti.*

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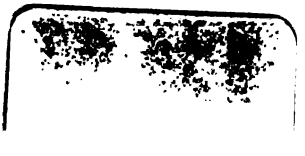

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